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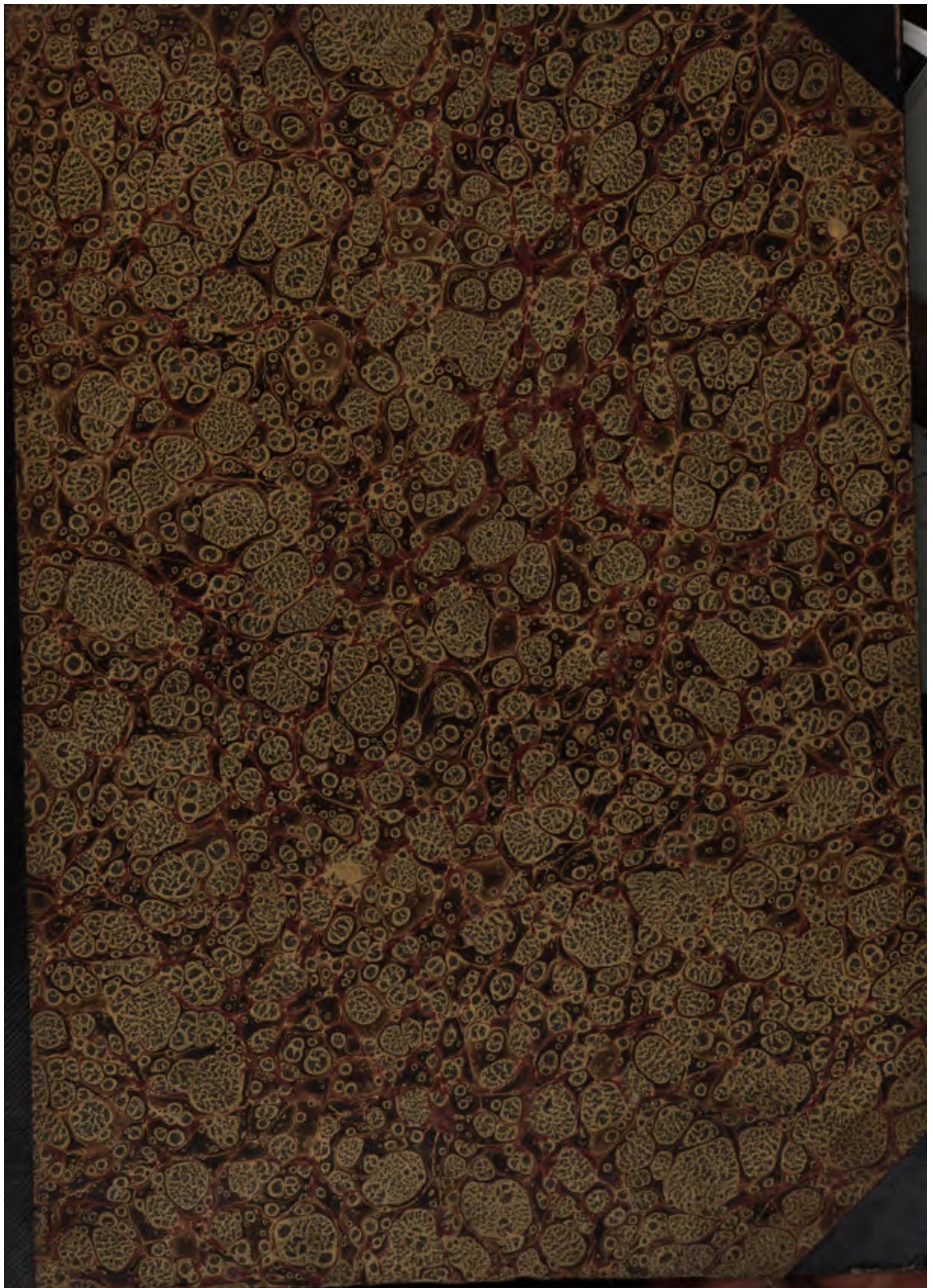
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A B S T R A C T S
OF
MAGNETICAL OBSERVATIONS

MADE AT THE
MAGNETICAL OBSERVATORY, TORONTO,
CANADA WEST,
DURING THE YEARS 1856 to 1862, INCLUSIVE
AND DURING
PARTS OF THE YEARS 1853, 1854, AND 1855.



TORONTO:
PRINTED BY LOVELL AND GIBSON, YONGE STREET,
1863.

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INTRODUCTION.

THE Magnetical Observations made at Toronto, under the auspices of the British Government, were brought to a close in the spring of 1853. Arrangements having been soon afterwards concluded by the Provincial Government for resuming the observations, a grant was made by the Imperial Government of the greater part of the instruments previously in use; while through the indulgence of the military authorities, the three non-commissioned officers of the Royal Artillery,—Messrs. Walker, Menzies, and Stewart,—who had been employed for many years as observers, were permitted to act in the same capacity, till they became permanently attached to the establishment on their discharge from the army, in 1855.* The duties of the Observatory were carried on under the general supervision of the Professor of Natural Philosophy† of University College, Toronto, until the appointment of the present director, G. T. Kingston, M.A., in August, 1855.

The differential observations were continued from July, 1853, to June, 1854. They were suspended during the demolition of the old Observatory and the construction of the present building, and were again resumed in July, 1855.‡

Observations for absolute declination were made occasionally in 1853 and 1854, and have been regularly continued since August, 1855.

Determinations of the absolute horizontal force have been made each month since September, 1855, inclusive, while those of the dip have been continued without intermission since the removal of the military establishment.

The instruments employed in obtaining the results given in the present volume are as follows :

Differential instruments—

Small Declinometer.

Small Bifilar, with silk suspension.

Ronalds' Bifilar, i.e., large bifilar, with silver wire suspension, used with Ronalds' photographic apparatus.

Brooke's Bifilar, or large bifilar, with silver wire suspension, used with Brooke's photographic apparatus.

Lloyd's Vertical Force Magnetometer.

* The staff was afterwards increased by the appointment of Mr. W. F. Davidson, who has been employed as supernumerary observer and computer since the commencement of the year 1857.

† J. B. Cherriman, M.A., late Fellow of St. John's College, Cambridge.

‡ The present Observatory occupies the same site as the old building—Lat. $43^{\circ} 39'.6$, Long. $5h. 17m. 33s.$, height above Lake Ontario, 108 feet, and approximate height above the sea, 342 feet.

Instruments for absolute determinations—

Apparatus for absolute declination.

Dip circle and needles.

Vibration and deflection apparatus, for determinations of absolute horizontal intensity.

The above-named instruments, with the exception of those for determining the absolute horizontal force, and two dipping-needles by Barrow, were the same that were used in the establishment under the Imperial Government.

The differential instruments were read commonly six times each day, namely, at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and at Midnight;* excepting on Sunday, Good Friday, and Christmas Day, when no magnetical observations were made.

The absolute determinations were made every month, occupying usually portions of four days about the middle of the month.

The differential instruments were first adjusted in June, 1853. They were removed in July, 1854, preparatory to the erection of the new building, and were again mounted in June, 1855, on the pedestals which they previously occupied, and which were undisturbed during the progress of the building. The dates at which alterations of any kind were made in the adjustments of the instruments, were as follows :

SMALL BIFILAR.

In consequence of the divergence of the magnet from its proper position at right angles to the magnetic meridian, occasioned by a progressive diminution of horizontal force and loss of magnetism, together with instrumental causes, this instrument was readjusted in December, 1860,—the observations having been suspended from December 10th to December 20th, inclusive. The magnet was also dismounted for temperature experiments, and the instrument was again adjusted in March, 1861, on which occasion the observations were suspended from March 19th to March 22nd.

RONALDS' BIFILAR.

Alterations in the position of the torsion circle were made December 22, 1856, and November 30, 1857.—On November 29, 1859, the magnet was dismounted, with a view of trying a suspension with glass thread; but on the experiment proving unsuccessful, the instrument was adjusted with a suspension of steel wire, and was brought into use on February 27, 1860,—the appendages connected with the photographic registration having been removed.

BROOKES' BIFILAR.

The only observations with this instrument employed in the present volume, are confined to those taken in 1861 and 1862, during which period no alterations of any kind were made in the adjustment.

LLOYD'S VERTICAL FORCE MAGNETOMETER.

No alterations in the adjustment of this instrument were made during the whole series. The needle was, however, dismounted for temperature experiments during portions of six days, from March 12—18, 1861.

* Strictly at 0h., 2h., 8h., 10h., 16h. and 18h., Gottingen astronomical time.

The scale coefficients of the bifilars for the period July, 1853—June, 1854, were derived from the formula $k=a \left(\frac{t'}{t''}\right)^2$; but subsequent to the recommencement of the observations in July, 1855, the results furnished by the formula were combined with those given by the method of deflections. The scale coefficient of Lloyd's vertical force magnetometer was determined by vibrations; those in the vertical plane being taken for the most part every week, but latterly on one day only in each month.

The temperature corrections employed in the reduction of the observations were in every case derived from the observations made with the instrument, by comparing the change of scale reading with the accompanying change in the attached thermometer. In the case of the bifilars, the method exclusively used was that explained in pp. xxiii. xxiv. of the third volume of the "Toronto Observations," where the observations compared are separated by intervals of a few days only.

Let t_1, t_2, t_3 , be the mean temperatures of three groups of days in chronological order, each group consisting of from one to three or four days each, and so selected that t_1-t_2 and t_3-t_2 may have the same signs. Also let R_1, R_2, R_3 be the corresponding mean scale readings of the instrument. Then the change in scale reading corresponding to a change of one degree of temperature (and which may be denoted by $\frac{\Delta R}{\Delta t}$) will be approximately equal to

$$\frac{\frac{R_1 + R_3}{2} - R_2}{\frac{t_1 + t_3}{2} - t_2}.$$

The temperature equivalent of Lloyd's vertical force instrument was obtained by combining the above method with that explained in pp. i. to iv. of the same volume, where t_1, t_2, t_3 are the mean temperatures of three equidistant quarters in order of time, t_1, t_3 being the temperatures of quarters of the same name, or of a spring and autumn quarter; and t_2 the temperature of the quarter midway between the other two.

The discordance often noticed between $\frac{\Delta R}{\Delta t}$, the temperature equivalent derived from the observations made with the instrument to which it relates, and $\frac{q}{k}$ (where q is the temperature coefficient of the magnet obtained from the hot and cold water experiments), and which is commonly attributed to the action of temperature changes on the instrument in adjustment, independent of and in addition to the effect on the magnetism of the magnet, would seem, in some instances at least, to be occasioned by a change produced by changes of temperature on the *distribution* of magnetism, and for which in the reduction of the experiments no allowance is usually made.

If (m) be the magnetic moment of the magnet whose temperature coefficient (q) is sought by the ordinary hot and cold water experiments,

(r) the distance between the magnetic centres of the suspended and deflecting magnets,

(u) the angle of deflection,

X the horizontal component of the force;

the relation between m, r, u and X will be given by the formula

$$m = f(r) \dot{X} \sin u, \left\{ \text{where } f(r) \text{ is some function of } r \right\}$$

and the relation between their simultaneous small changes by

$$\frac{\Delta m}{m} = \frac{f'(r)}{f(r)} \Delta r + \cot u \Delta u + \frac{\Delta X}{X}.$$

Now if $\frac{\Delta m}{m}$ be the relative increase in the magnetic moment due to a decrease of $t-t_0$ degrees in the temperature, and q that due to a decrease of one degree, so that $\frac{\Delta m}{m} = q(t-t_0)$ the preceding equality will become

$$q = \frac{1}{t-t_0} \left\{ \frac{f'(r)}{f(r)} \Delta r + \cot u \Delta u + \frac{\Delta X}{X} \right\}.$$

Suppose the north end of the deflector to be nearest to the suspended magnet, and that a decrease of one degree in the temperature causes the magnetic centre to recede from the north end by the small quantity (a), so that $\Delta r = (t-t_0)a$; also let q_1 be the value of q calculated (in conformity with the ordinary practice) on the supposition that r is constant, or that $\Delta r = 0$; we shall then have

$$q = \frac{f'(r)}{f(r)} a + q_1.$$

Similarly if q_2 be the value of q similarly derived from experiments made with the *south* end of the deflector presented,

$$q = -\frac{f'(r)}{f(r)} a + q_2;$$

$$\text{whence } q = \frac{1}{2} \{ q_1 + q_2 \};$$

or the temperature coefficient q will be the arithmetic mean between q_1 and q_2 , the values derived from experiments in which the north and south poles of the deflector respectively are presented.

That an alteration in the distribution of magnetism does sometimes accompany changes of temperature would seem to follow from the temperature experiments on the small bifilar magnet, in March, 1861.

From experiments with the North pole presented $q_1 = 0000603$,
 and with the South pole $q_2 = 0001105$,
 whence $q = 0000854$.
 But $k = 000115$;
 which gives $\frac{q}{k} = 0.74$.

Now from the observations with the instrument during the period to which the foregoing value of k relates, the equivalent in scale readings for 1° of temperature $\frac{\Delta R}{\Delta t} = 0.66$.

The agreement between $\frac{\Delta R}{\Delta t}$ and $\frac{q}{k}$ though not perfect, is much closer than if q_2 had been adopted as the true value of q , and which, it may be noticed, agrees very nearly with the results of a series of experiments in 1843 and of another series in 1845, which gave respectively

$$q = 0001032 \text{ and } q = 0001138.$$

Experiments of a similar kind made with Lloyd's vertical force instrument yielded the following results :

With the North pole presented	$q_1=0001018,$
and with the South pole	$q_2=0000666,$
and therefore	$q=0000842.$
But from vibrations	$k=000066 ;$
whence	$\frac{q}{k}=1.28,$
and	$\frac{q_1}{k}=1.54.$

But from the observations $\frac{\Delta R}{\Delta t} = 1.82 ;$

which agrees better with $\frac{q_1}{k}$ than it does with $\frac{q}{k}.$

From this it appears that the error occasioned by taking q_1 instead of q , is in a great degree compensated by the effects of changes of temperature on the instrument, independent of those produced on the magnetism of the magnet.

By referring to pages 26 and 27 of the third volume of the "Toronto Observations," it will be seen that the temperature experiments with this needle in 1843-44 gave $q=0001112$, which does not differ greatly from q_1 of 1861 ; and that the experiments in 1846 gave $q=00007$, which differs very little from q_2 . This similarity between q_1 and q_2 , and the results of the experiments in 1843-44, and of those in 1846, render it very probable that the north end of the magnet was presented in the first series of experiments and the south end in the second.

The disagreement between q_1 and q_2 , with respect to the magnets both of the small bifilar and vertical force instrument, is probably an exceptional property ; but the fact that it should be found to exist, even in one instance, would seem a sufficient ground for directing both poles in succession towards the suspended magnet, wherever temperature experiments are performed.

While $\frac{\Delta R}{\Delta t}$ and $\frac{q}{k}$ are frequently found to be at variance, marked exceptions are sometimes met with. Thus with reference to Ronalds' bifilar :

*By temperature experiments in February, 1860	$q = 000173$
But from July, 1853, to July, 1854	$k = 000186$
whence	$\frac{q}{k} = 0.93$
But from the observations in 1853-4	$\frac{\Delta R}{\Delta t} = 0.88$
From July, 1855, to December, 1856 :	
By deflections	$k = 000147 ;$
whence	$\frac{q}{k} = 1.177.$
Also from the observations	$\frac{\Delta R}{\Delta t} = 1.23.$

* According to a memorandum of Colonel Lefroy, the value of q was found by him to be 000172.

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From December, 1856, to November, 1857 :

By deflections $k = 000121$;

whence $\frac{q}{k} = 1.43$.

Also from the observations $\frac{\Delta R}{\Delta t} = 1.43$.

From December, 1857, to November, 1859 :

By deflections $k = 000063$;

whence $\frac{q}{k} = 2.746$.

And from the observations $\frac{\Delta R}{\Delta t} = 2.760$.

In the preceding adjustments the agreement is very close between $\frac{\Delta R}{\Delta t}$ and $\frac{q}{k}$, but subsequent to the last adjustment in February, 1860, it was no longer maintained. Thus by deflections :

$$k = 000508,$$

$$\frac{q}{k} = 0.34,$$

$$\text{and } \frac{\Delta R}{\Delta t} = 0.128.$$

REDUCTION OF THE OBSERVATIONS.

The general process by which the differential observations were reduced ^{was} ~~were~~ the following :

(1) The readings of the force instruments were reduced to an uniform temperature of 55°, by the application of the proper temperature corrections.

(2) For the several instruments, normal scale readings for each observation hour were calculated by taking the average of all the readings at like hours in a month, or more suitable group of consecutive days, omitting the larger disturbances, or such readings as differed from the normal *finally adopted*, by an amount equivalent to the limit employed by General Sabine in the third volume of the "Toronto Observations," namely, 5'.0 for the declination, .0012 for the horizontal force, and .00026 for the vertical force.

(3) The mean of the six normals, or the six-hour daily mean normal, was then employed as a standard of reference for the six-hour daily means of each day included in the group from which the normal was derived. The six-hour daily mean normal being subtracted from each six-hour daily mean, the remainders (expressed in minutes for the declination, and in parts of the horizontal and vertical components of the force) gave the abnormal deviations of the daily means; the sign (+) indicating an easterly deviation of declination, and a deviation of the force in excess, and the sign (—) indicating an opposite deviation.

(4) From the six-hour daily mean normals were then obtained the twenty-four-hour daily mean normals, by applying the corrections for diurnal variation deduced from the tables in pp. 90-92 of "Toronto Observations," vol. iii.

(5) The twenty-four-hour mean normals being then subtracted from the normals of each observation hour, the remainders reduced by the scale coefficients gave the diurnal variations at each observation hour, as furnished by the several instruments.

(6) The abnormal deviations of the daily means and the diurnal variations of the horizontal force, where the observations of more than one bifilar have been employed, have been regarded as equal to the means of the corresponding numbers given by the two or the three bafilars.*

(7) The abnormal deviations of the daily means and the diurnal variations of the total force (ϕ) and inclination (θ), were calculated from those of the horizontal and vertical forces (X and Y), by the formulæ

$$\frac{\Delta\phi}{\phi} = \cos^2\theta \frac{\Delta X}{X} + \sin^2\theta \frac{\Delta Y}{Y}$$

$$\Delta\theta = \frac{1}{2} \sin 2\theta \left\{ \frac{\Delta Y}{Y} - \frac{\Delta X}{X} \right\}$$

(8) In collecting the disturbances of the horizontal force, where the results furnished by more than one bifilar have been combined, the combination has been effected as follows. The normals for each bifilar being found in the usual way, the differences therefrom of the disturbed readings, and expressed in parts of the horizontal force, were placed in parallel columns and in chronological order. In the great majority of observations, where one instrument gave a disturbed reading the others did so also; but when this was not the case the blank was filled up with the difference, whatever it might be, between the observed reading and the corresponding normal. The means of the two or the three corresponding entries in the different columns being then computed, those were retained as disturbances which equalled or exceeded .0012.

(9) The disturbances of the horizontal and vertical components of the force being found, the corresponding abnormal deviation $\Delta\phi$, of the total force, and $\Delta\theta$, of the inclination, were calculated by the formulæ

$$\frac{\Delta\phi}{\phi} = \cos^2\theta \frac{\Delta X}{X} + \sin^2\theta \frac{\Delta Y}{Y}$$

$$\Delta\theta = \frac{1}{2} \sin 2\theta \left\{ \frac{\Delta Y}{Y} - \frac{\Delta X}{X} \right\}$$

where $\frac{\Delta X}{X}$ and $\frac{\Delta Y}{Y}$ represent the contemporaneous abnormal deviations of the horizontal and vertical components of the force where one or both of them are disturbed.

* The observations by the small bifilar and by Ronalds' bifilar have been commonly used in conjunction in the computation of the tables, but those furnished by one or other of these instruments have been excluded from the abnormal variation of daily means when a break has occurred in the course of the month, such as to require the daily means in two portions of the month to be referred to different normals. In calculating the disturbance of the horizontal force, the numbers supplied by one of these bafilars only has been employed when an instrumental change has taken place in the other bifilar, respecting the precise epoch of whose occurrence any doubt has existed, so as to render the results given by one instrument more worthy of confidence than that derived from the combination of the two. Several exclusions of this kind occurred with the small bifilar, most of which were in 1856, and some few in 1857, 1858, and 1859. Brooke's bifilar has been combined with the other two bafilars in computing the disturbances in 1861, and the abnormal variations of daily means in 1861 and 1862.

Of the resulting values of $\Delta\phi$ and $\Delta\theta$, those and those only were regarded as disturbances which equalled or exceeded the limits determined on for these elements, namely, .0004 for the total force, and 1.0 for the inclination.

REMARKS ON THE TABLES.

Tables I. to X. exhibit the aggregate values of the disturbances of the several magnetical elements, together with their constituents of opposite signs, distributed into the different years of their occurrence, as well as the ratios which the annual sums respectively bear to the average of the annual sums in the seven years terminating December 31, 1862, for Tables I. III. V. VII. IX.; and for the seven years terminating June 30, 1862, for the remaining tables. At the foot of each table are given the ratios expressing for each year, and for the seven years collectively, the relative amount of disturbance of opposite signs.

The results are given for the years ending June 30 as well as for the ordinary years, for the sake of including the year ending June 30, 1854, and also for the purpose of comparison with the earlier results at Toronto, and with the results at other stations where the years have been so divided. The year ending June 30, 1856, includes, for the declination, an approximation to the amount of disturbance in July, 1855, calculated on the assumption that it would bear to the amount in the concluding months of that year, the same ratio as that furnished by the whole series—1856 to 1862. Approximate values of the disturbances of the vertical force for July, and of the horizontal force, total force, and inclination, both for July and August, 1855, have been similarly found and employed in calculating the aggregates of disturbance for the year ending June 30, 1856.

The ratios shewing the relative amount of disturbance of opposite signs in the seven years ending June 30, 1862, are, excepting for the declination, in every case less than those furnished by the same six observation hours in the five years ending June 30, 1848.

Thus referring to the tables in vol. iii. of the "Toronto Observations," for the ratios that relate to the earlier series, and to the tables of this volume for the ratios belonging to the later series, we find as follows:

Declination	$\left\{ \begin{array}{c} \text{Easterly} \\ \text{to} \\ \text{Westerly} \end{array} \right\}$	0.97	Calculated from Table XLVIII.	1.28	From Table II.
Hor. Force	$\left\{ \begin{array}{c} \text{Decreasing} \\ \text{to} \\ \text{Increasing} \end{array} \right\}$	5.43	" " Tables VIII. & IX.	3.53	" Table IV.
Ver. Force	$\left\{ \begin{array}{c} \text{Decreasing} \\ \text{to} \\ \text{Increasing} \end{array} \right\}$	1.41	" " Tables XXIII. & XXIV.	1.05	" Table VI.
Total Force	$\left\{ \begin{array}{c} \text{Decreasing} \\ \text{to} \\ \text{Increasing} \end{array} \right\}$	1.89	" " Tables XLI. & XLII.	1.43	" Table VIII.
Inclination	$\left\{ \begin{array}{c} \text{Increasing} \\ \text{to} \\ \text{Decreasing} \end{array} \right\}$	4.59	" " Table XXXII.	3.47	" Table X.

Table XI. has been drawn up for the purpose of comparing the amount of disturbance of each kind in the five years from 1844 to 1848, with those of the later series. The years in every case terminate with June 30, and the numbers are those furnished by the observations made at the same six hours.

In Table XII., the numbers in Table XI. have been expressed in terms of the average of the seven yearly sums for the seven years terminating June 30, 1862. These units of reference are employed to shew better the periodic character of the last seven years; and though not adapted to exhibit so distinctly the position of the several years, 1844-1848, in the decennial period in which these years are included, they render sufficiently apparent the relative magnitude of the annual aggregates in the two series.

On examining Tables XI. and XII. it will be seen that 1856 and 1857 were years of minimum disturbance, and 1860 a year of maximum disturbance. The year 1859 shews a breach of continuity; its disturbances, excepting those of the declination, amounting to less than those of 1858 and 1860. If the years ending December 31 be compared, 1859 becomes the maximum year, chiefly on account of the extraordinary disturbance that accompanied the celebrated auroral display in September, 1859; but in this case, the disturbances of 1861 were, in several instances, slightly less than in 1860 and 1862.

One striking peculiarity in these tables consists in the extraordinary amount of disturbance of all the elements in the year ending June 30, 1854. The observations during that year were taken under rather unfavourable circumstances. Portions of the building were in course of reconstruction, and workmen, with iron tools, were much about the premises; but as it is believed that great care was always taken to ascertain that no iron was left in dangerous proximity to the instruments during the observations, the anomalous character of the results cannot be thus wholly explained. It will be seen that of the three instrumentally independent elements, the vertical force was most affected,—the amount of disturbance in this year so near to that of the expected minimum being actually in excess of that of 1848, the epoch of maximum disturbance.

Tables XIII. to XXVII. contain the aggregate values of the disturbances of the magnetical elements, together with those of their constituents of opposite signs, distributed into the several months of their occurrence. The final column on the right contains the ratios that the twelve numbers in the preceding column respectively bear to the average of the said twelve numbers. The observations employed in the computation of the ratios are limited to those of the seven years 1856 to 1862 inclusive.

For the purpose of approximate comparison, in Table XXVIII. the ratios corresponding to the preceding, and derived from the series from July 1, 1843, to June 30, 1848, as given in the third volume of the "Toronto Observations," have been placed in juxta-position with the ratios of the later series. The ratios are not strictly comparable on account of the fact that the later series embraces only the disturbances of six hours each day, whereas the earlier series includes those at each of the twenty-four hours. This circumstance will partly explain the following observed points of difference in the two series :

(1) The maxima and the minima, in the more recent series, are less distinctly developed than in the earlier series.

(2) In five instances the September maximum is transferred to October.

(3) In nearly every case the April maximum occurs in March, and in the general disturbance of declination, as well as in those of westerly disturbance, the ratio is less than unity.

(4) In every case there is an abrupt decrease in the November disturbances, with a subsequent increase in December.

The generality of these points of difference, as far as they extend, will be better seen by comparing the means of the ratios, for the declination, horizontal force and vertical force, as given in the following table :

	January.	February.	March.	April.	May.	June.	July.	August.	Septem'r.	October.	Novemb.	December
1844—1848	0.57	0.84	1.04	1.47	1.00	0.46	0.75	0.99	1.64	1.36	0.84	0.65
1856—1862	0.70	0.63	1.10	1.03	0.84	0.74	1.05	1.29	1.60	1.44	0.57	1.01

Tables XXIX. to XXXIII. give the aggregate values of the disturbances of the several magnetical elements, together with those of their constituents of opposite signs, distributed into the different hours of their occurrence. The ratios in the final column are the values of the six hourly sums in the preceding column, expressed in terms of the average of the said six sums.

Table XXXIV. gives a comparative view of the diurnal distribution of the disturbances in the five years ending June, 1848, and in the seven years ending December, 1862. The ratios for the earlier series are not identical with those in vol. iii., but are obtained by expressing the sums of the disturbances at the six observation hours in terms of the average of those six sums, instead of the average of the twenty-four hourly sums, as in the volume referred to.

On comparing the two series, the chief characteristic in the later series would appear to be that the distinctive features of different parts of the day, as shown in the earlier series, are somewhat softened down; the ratios that are above unity being for the most part less, and those that are less than unity being greater in the later than in the earlier series. In one case only, namely, in the disturbances that increase the horizontal force at 8 A.M., do the ratios lie on opposite sides of unity in the two series; but on reference to Table VIII. of Vol. III., it is found that the ratios at 9 A.M. and 10 A.M. are 0.94 and 1.46, so that the discrepancy amounts only to a transfer of the passage through unity from about 9 A.M. to 8 A.M.

Tables XXXVI. to XL. give the solar diurnal variation of the several magnetical elements at the six observation hours for each separate month in which the instruments were in operation. The means are in each case limited to the seven years ending December 31, 1862.

Tables XLI. to XLV. contain for each of the seven years the annual and semi-annual means, and semi-annual inequalities of the diurnal variation computed from Tables XXXVI. to XL. The numbers in the table of semi-annual inequalities are obtained by subtracting the numbers in the tables of annual mean diurnal variation from the corresponding numbers when the sun was north of the equator; the signs of the inequalities, therefore, correspond to the six months from April to September inclusive.

Table XLVI. furnishes at one view, and on the average of seven years, the solar diurnal variations of the several magnetical elements at the six observation hours for each month, as well as for the year and for the winter and summer half-years,—the former extending from October to March inclusive, and the latter from April to September.

Table XLVII. exhibits a comparative view of the annual and semi-annual mean diurnal variation and semi-annual inequality, as furnished by the average of the five years ending June 30, 1848, and by the average of the seven years ending June 30, 1862. The comparison exhibits a close resemblance in form, accompanied in most instances by an increase in the numerical values of the variations, which is strikingly conspicuous in the case of the horizontal force.

It will be seen from the mode in which the foregoing tables on the solar diurnal variation have been obtained, that the independent testimony that they supply relates only to the *difference* between the diurnal variations at the several hours, and that the absolute values of the variations are affected by constants, themselves derived from the older series, but which of course disappear from the amplitudes of the diurnal ranges.

From the following table, containing an approximation to these amplitudes, it may be noticed that the progression from year to year is substantially the same as that of the yearly aggregates of the disturbances, as shewn by Tables I. III. V. VII. and IX.; and that in every case but in that of the declination, the increase in the aggregate disturbance of 1862 above that of 1861, is accompanied by an increase in the amplitude of the diurnal range.

Table giving the approximate mean annual amplitudes of the solar diurnal variation, or the differences between the annual mean diurnal variations at the two hours selected from the six hours of observation as being nearest to the hours of maximum and minimum variation; the years in each case ending December 31.

			1856.	1857.	1858.	1859.	1860.	1861.	1862.	Means. 1856 to 1862.
Declination	E. extreme	8 a.m.	8'.27	8'.99	10'.25	12'.34	11'.85	11'.20	10'.81	10'.53
	W. extreme	2 p.m.								
Hor. Force	Minimum	8 a.m.	.000437	.000311	.000574	.000688	.001042	.000507	.000620	.000597
	Maximum	4 p.m.								
Ver. Force	Minimum	8 a.m.	.000136	.000105	.000164	.000222	.000196	.000200	.000230	.000179
	Maximum	4 p.m.								
Total Force	Minimum	8 a.m.	.000155	.000128	.000190	.000252	.000251	.000219	.000255	.000207
	Maximum	4 p.m.								
Inclination	Maximum	8 a.m.	15'.2	19'.5	23'.5	24'.5	42'.6	15'.4	19'.6	22'.89
	Minimum	4 p.m.								

Table XLVIII. gives for every day in which the instruments were in operation the abnormal variation of the daily means of each of the magnetical elements.

At the foot of each column, in every case wherein the requisite data could be procured, are placed the absolute values of the magnetic elements reduced to the normal mean of twenty-four hours. By applying to these absolute values the abnormal variations of the daily means of the respective elements, the absolute mean values of those elements on each day can be obtained, provided that it be assumed that the six-hour mean of each day differs from the six-hour monthly normal by the same

amount as the twenty-four-hour mean of the same day would differ from the normal derived from the twenty-four hourly normals.

Thus if Ψ be the absolute declination reduced to the normal mean of twenty-four hours, the mean absolute declination Ψ_1 , on any given day in which the abnormal variation is $\Delta\Psi$, will be given by the formula

$$\Psi_1 = \Psi + \Delta\Psi;$$

Similarly, if X, Y, ϕ, θ be the absolute values of the horizontal force, vertical force, total force, and inclination, reduced to the normal mean of twenty-four hours; $X_1, Y_1, \phi_1, \theta_1$ the required corresponding values on the days in which the abnormal variations were respectively $\frac{\Delta X}{X}, \frac{\Delta Y}{Y}, \frac{\Delta \phi}{\phi}, \Delta \theta$; we shall then have

$$X_1 = X \left\{ 1 + \frac{\Delta X}{X} \right\};$$

$$Y_1 = Y \left\{ 1 + \frac{\Delta Y}{Y} \right\};$$

$$\phi_1 = \phi \left\{ 1 + \frac{\Delta \phi}{\phi} \right\};$$

$$\theta_1 = \theta + \Delta \theta.$$

Tables XLIX. L. and LI. give a detailed statement of the dates and values of certain disturbed observations of declination, total force, and inclination, selected on account of their magnitude from the whole body of the disturbances of these elements. The limits employed for the selection are $15'$ for the declination, $.001$ for the total force, and $3'$ for the inclination.

The relative number and relative aggregate value of these extraordinary disturbances in different years, as compared with the numbers and aggregate values of all the disturbances, are expressed by the ratios in the two subjoined tables.

TABLE giving the ratios in different years of the numbers of extraordinary disturbances included in Tables XLIX. L. and LI. to the number of *all* the disturbances of the same kind.

	1853-4	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1856 to 1862.		
									+	-	Without regard to Sign.
Declination.....	0.13	0.04	0.09	0.10	0.17	0.17	0.09	0.11	0.10	0.14	0.12
Total Force.....	0.16	0.08	0.09	0.20	0.25	0.28	0.22	0.25	0.16	0.26	0.22
Inclination	0.08	0.05	0.13	0.12	0.17	0.14	0.11	0.10	0.17	0.05	0.12

TABLE giving the ratios in different years of the amount of the extraordinary disturbances included in Tables XLIX. L. and LI. to the amount of *all* the disturbances of the same kind.

	1853-4	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1856 to 1862.		
									+	-	Without regard to Sign.
Declination.....	0.30	0.09	0.30	0.21	0.36	0.37	0.21	0.28	0.22	0.36	0.28
Total Force.....	0.40	0.21	0.39	0.44	0.56	0.58	0.43	0.49	0.38	0.56	0.48
Inclination	0.22	0.14	0.42	0.29	0.45	0.44	0.27	0.26	0.41	0.15	0.35

It will be noticed that the ratios in both tables follow a progression not greatly differing from that found to exist in the ratios that express the distribution of the amount of disturbance in different years: thus in 1856, a year of minimum disturbance, the ratios in the preceding tables are least; and in 1859 and 1860, years of maximum disturbance, the ratios also reach a maximum.

In Table LII. are given the mean absolute declinations of each month during the years 1856 to 1862, and occasionally during the years 1853, 1854, and 1855. The mean monthly declinations contained in the table, in almost every instance, are the means of six separate determinations made at intervals during two or three consecutive days. Each determination includes five readings of the collimator scale, accompanied by simultaneous readings of the small declinometer, by aid of which the partial determination was reduced to the twenty-four-hour mean normal reading for the month of the small declinometer. The table embraces certain months for which the declinations have been already published in the third volume of the "Toronto Observations," and from which the declinations given in this table differ to a small extent, in consequence of the declinations in vol. iii. having been reduced to the general mean of the month, including the *disturbed* as well as the *undisturbed* readings of the small declinometer. The declination for January, 1854, has been omitted, on account of the great discordance of the partial results.

The mean monthly increase of westerly declination, derived by the method of least squares from eighty-four equations, furnished by the monthly declinations of the seven years, 1856 to 1862, is 0'.2746; which, if the *rate* of westerly movement be considered to increase equably, will be the monthly rate corresponding to July 1, 1859. But it has been elsewhere found that the monthly increase proper to July 1, 1848, is 0'.1627: whence the mean annual increase in the mean monthly westerly movement will be $\frac{0'.1119}{11} = 0'.0102$ nearly.

The probable error of a single monthly determination is 0'.719, and the probable error of the mean determination $2^{\circ} 7'.05$, corresponding to July 1, 1859, is 0'.077.

Table LIII. contains the monthly determinations of the dip, taken according to the method of which the details are given in the preceding volumes of the "Toronto Observations." The observations were commonly made on three consecutive days, as nearly as possible about the middle of the month. One determination was usually made each day, between noon and 1 P.M.; but prior to August, 1858, another determination was also made between 11 A.M. and noon. The values of the

dip given in the table are those derived directly from the observations, being uncorrected for diurnal variation. The annual means exhibit a very distinct progressive change with a maximum of inclination in 1859.

The annual variation of dip derived from the nine years, 1854 to 1862, is not so distinctly developed as in the series 1841 to 1855. By combining two and two, the mean inclination of the six pairs of months, situated at equal distances from the middle of the year, we find as follows :

January	and December	—Mean inclination=	75° 23'.77	} 75° 24'.05. Sun in South declination.
February	" November	" "	24.00	
March	" October	" "	24.37	
April	" September	" "	24.33	} 75° 23'.23. Sun in North declination.
May	" August	" "	23.86	
June	" July	" "	23.51	

Whence the inclination in January and December exceeds that of June and July by 0'.26
And the inclination in the winter half-year exceeds that of the summer half-year by 0'.82
In the earlier series the corresponding numbers are 1'.71 and 0'.97.

Table LIV. gives the absolute values of the horizontal force for each month, from September, 1855, to December, 1862. The observations that supply the materials for computation were made with a very excellent vibration and deflection apparatus, by Jones, of Rupert-street. The magnet in use from September, 1855, to November, 1856, having been broken by a fall, it was replaced by another, which was employed to the end of the series.

For the first magnet, the values of the constants P and Q in the expression

$$\frac{m}{X} = \frac{r^3}{2} \frac{\sin u}{1 + \frac{P}{r^2} + \frac{Q}{r^4}},$$

derived by the method of least squares from 102 deflections, were

$$P = -0.010834$$

$$Q = +0.004635$$

For the second magnet, the values of these constants obtained from 96 deflections, were

$$P = -0.018303$$

$$Q = +0.009329$$

The induction coefficient (μ), of the magnet in use subsequent to November, 1856, was determined by an apparatus constructed at Toronto, on the principle of that employed by the late Mr. Welsh, of Kew. Its value was $\mu = 0.00120$. In consequence of the breakage of the first magnet before the experiments for induction were entered on, the determinations made with that magnet were approximately corrected for induction by the employment of the above-named value of μ .

The determinations since July, 1858, were made from the observations during two days in each month, two sets of vibrations and deflections at two distances being taken each day. Prior to that time the observations occupied three days, and the deflections were made each day at three distances. In reducing the observations, the value of $\log \frac{m}{X}$ deduced from each separate deflection were combined with the mean value of $\log mX$ derived from the two sets of vibrations taken in the same day.

The partial determinations of the horizontal force being reduced to the mean bifilar reading of the day, by the aid of simultaneous corresponding readings, they were afterwards reduced to the normal mean of the month by the application (with a contrary sign) of the abnormal variations of the means of horizontal force of the days on which the determinations were made. The values of the horizontal force given in Table LIV. are the monthly means of the partial values reduced in the manner just described.

The annual means at the foot of the table indicate that the decrease of the horizontal force, previously apparent, was arrested about the years 1859 and 1860,—the epoch of maximum inclination, as shewn by Table LIII.

The mean monthly values of the total force (ϕ), deduced from the formula $\phi = X \sec. \theta$, by the substitution of the corresponding values of the inclination (θ) and of the horizontal force (X), supplied by Tables LIII. and LIV. are given in Table LV.

From this table it appears that the change of total force has been for the most part a decrease; and by comparing the annual means with those on page xcii. of the second volume of the "Toronto Observations," it would seem that the change in the total force underwent a change of sign between the years 1848 and 1856.

The supposition that the total force has been generally decreasing during the years 1856 to 1862, is supported by the indication of the Vertical Force Magnetometer.

If m be the magnetic moment of the vertical force magnet,
 T the time of its vibration in the horizontal plane,
 X and Y the horizontal and vertical components of the force;
 we have $mX = \frac{C}{T^2}$,

$$\text{and } \frac{\Delta m}{m} + \frac{\Delta X}{X} = -2 \frac{\Delta T}{T} \dots\dots\dots (1)$$

where (ΔT) is the observed change in the time of vibration occasioned by a change (Δm) of the magnetic moment, and by a change (ΔX) of the horizontal force between two given epochs.

$$\text{But } \frac{\Delta m}{m} + \frac{\Delta Y}{Y} = kn \dots\dots\dots (2)$$

in which (ΔY) is the corresponding change in the absolute vertical force, and (n) the change in scale reading of the vertical force instrument, (k) being its scale coefficient;

Hence from equations (1) and (2),

$$\frac{\Delta Y}{Y} = kn + 2 \frac{\Delta T}{T} + \frac{\Delta X}{X} \dots\dots\dots (3)$$

Now, regarding (n) as the mean annual change in the scale readings of the vertical force instrument during the seven years of observation, and ΔT , ΔX , ΔY as the corresponding mean annual changes of T , X , and Y ; the numerical values of the quantities required for substitution in equation (3) will be as follows:

From the seven annual means of the monthly normals it is found by the method of least squares that $n = -8.24$ scale divisions, and $kn = -.000544$.

Again, the time of a vibration of the Vertical Force Magnet in the horizontal plane

in June, 1855, was	10.377
and in June, 1863,	10.394

$$\text{whence } \Delta T = \frac{0.017}{8}$$

$$\text{and } T = 10.3855$$

$$\text{and therefore } \frac{\Delta T}{T} = .000409$$

A value of $\frac{\Delta X}{X}$ sufficiently near the truth for shewing the *general* character of the progressive change in the total force is that derived by least squares from the seven annual means in Table LIV. We thus obtain $\Delta X = - .0028$

$$\text{and } X = 3.4875$$

$$\text{and consequently } \frac{\Delta X}{X} = -.000803 \dots\dots\dots (4)$$

By substitution in equation (3),

$$\begin{aligned} \frac{\Delta Y}{Y} &= -.000544 + .000409 - .000803 \dots\dots\dots (5) \\ &= -.000938 \end{aligned}$$

Again, employing the values of $\frac{\Delta X}{X}$ and $\frac{\Delta Y}{Y}$ given by equations (4) and (5), we have

$$\begin{aligned} \frac{\Delta \phi}{\phi} &= \cos^2 \theta \frac{\Delta X}{X} + \sin^2 \theta \frac{\Delta Y}{Y} \\ &= .000929 \end{aligned}$$

But the mean value of the total force derived from Table LV. is

$$\begin{aligned} \phi &= 13.8384; \\ \text{whence } \Delta \phi &= -.0129 \end{aligned}$$

From this it appears that the total force was affected during the years 1856 to 1862, by a mean annual decrease of .0129,—a result approaching very nearly to that derived from the seven yearly means in Table LV. which give a mean annual decrease of .0131 in the total force.

The two values of the annual decrease of ϕ are evidently not wholly independent, inasmuch as both involve the value of $\frac{\Delta X}{X}$ derived from the absolute determinations of horizontal force. For the purpose however of ascertaining, from the Vertical Force Instrument, the *fact* of a decrease in the total force, it is sufficient to know that $\frac{\Delta X}{X}$ is *not* positive; or, if positive, that its numerical value is not large enough to render positive the right-hand numbers of equations (5) and (6).

It is not unlikely that the near approach to coincidence in the two values of $\Delta \phi$ may be in part accidental. The values of ϕ derived from X and θ by the formula $\phi = X \sec \theta$, are necessarily affected by the errors in the determination of X and θ , exaggerated by large multipliers, which in ϕ are sufficient to mask its smaller changes, and render futile any attempt by more exact methods than those here employed to evolve their numerical values with precision.

To determine the extreme and mean values of the total force in the secular period, with its epochs of maximum and minimum, a longer series of observations is demanded, and the employment of methods independent of those made use of in determining the absolute values of the inclination and horizontal force.

G. T. KINGSTON.

TORONTO MAGNETICAL OBSERVATIONS.

TABLE I.

Aggregate values of the Magnetic Disturbances distributed into the different years of their occurrence, with the ratios which they bear to the mean of the aggregates, from 1856 to 1862 inclusive.

DECLINATION—YEAR ENDING DECEMBER 31.

YEARS.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Mean. 1856 to 1862.
Without regard to sign	439.3	649.0	1083.8	1616.4	1540.9	1250.0	1512.5	1156.0
Ratios	0.38	0.56	0.94	1.40	1.33	1.08	1.31	...
Easterly	299.4	337.0	773.3	866.1	824.2	655.2	706.7	637.4
Ratios	0.47	0.53	1.21	1.36	1.29	1.03	1.11	...
Westerly	139.9	312.0	310.5	750.3	716.7	594.8	805.8	518.6
Ratios	0.27	0.60	0.60	1.45	1.38	1.15	1.55	...
Ratios of Easterly to Westerly } Disturbances	2.14	1.08	2.49	1.15	1.15	1.10	0.88	1.23

TABLE II.

DECLINATION—YEAR ENDING JUNE 30.

YEARS.	1854.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Mean. 1856 to 1862.
Without regard to sign	1493.5	366.0	423.5	961.4	1200.3	1698.0	1465.1	1118.1	1033.2
Ratios	1.45	0.35	0.41	0.93	1.16	1.64	1.42	1.08	...
Easterly	845.7	154.1	293.4	612.0	791.8	882.0	757.9	569.9	580.2
Ratios	1.46	0.27	0.50	1.06	1.36	1.52	1.31	0.98	...
Westerly	647.8	211.9	130.1	349.4	408.5	816.0	707.2	548.2	453.0
Ratios	1.43	0.47	0.29	0.77	0.90	1.80	1.56	1.21	...
Ratios of Easterly to Westerly } Disturbances	1.31	0.73	2.26	1.75	1.94	1.08	1.07	1.04	1.28

TABLE III.

HORIZONTAL FORCE—YEAR ENDING DECEMBER 31.

YEARS.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Mean. 1856 to 1862.
Without regard to sign	0.29209	0.47315	0.91632	1.19030	1.06733	0.69211	0.77657	0.77255
Ratios	0.38	0.61	1.19	1.54	1.38	0.90	1.00	...
Increasing	0.08356	0.07993	0.20972	0.25554	0.24226	0.13986	0.19330	0.17202
Ratios	0.48	0.47	1.22	1.49	1.41	0.81	1.12	...
Decreasing	0.20853	0.39322	0.70660	0.93476	0.82507	0.55225	0.58327	0.60053
Ratios	0.35	0.65	1.18	1.56	1.37	0.92	0.97	...
Ratios of decreasing to increasing } Disturbances	2.50	4.92	3.37	3.66	3.41	3.95	3.02	3.49

TORONTO MAGNETICAL OBSERVATIONS.

TABLE IV.

Aggregate values of the Magnetic Disturbances distributed into the different years of their occurrence, with the ratios which they bear to the mean of the aggregates, from 1856 to 1862 inclusive.

HORIZONTAL FORCE—YEAR ENDING JUNE 30.

YEARS.	1854.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Mean. 1856 to 1862.
Without regard to sign	0.52976	0.29738	0.25783	0.85312	0.74903	1.34365	0.93774	0.57405	0.71611
Ratios	0.74	0.41	0.36	1.19	1.05	1.88	1.31	0.80	...
Increasing.....	0.10512	0.09122	0.04704	0.18107	0.16709	0.28862	0.21343	0.11783	0.15804
Ratios	0.67	0.58	0.30	1.15	1.06	1.83	1.35	0.75	...
Decreasing	0.42464	0.20616	0.21079	0.67205	0.58194	1.05503	0.72431	0.45622	0.55807
Ratios	0.76	0.37	0.38	1.20	1.04	1.89	1.30	0.82	...
Ratios of decreasing to in- creasing Disturbances }	4.04	2.26	4.48	3.71	3.48	3.66	3.39	3.87	3.53

TABLE V.

VERTICAL FORCE—YEAR ENDING DECEMBER 31.

YEARS.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Mean. 1856 to 1862.
Without regard to sign	0.09256	0.16055	0.23406	0.34036	0.29418	0.24818	0.25819	0.23258
Ratios.....	0.40	0.69	1.01	1.46	1.26	1.07	1.11	...
Increasing.....	0.03559	0.06712	0.12823	0.17915	0.13212	0.13309	0.12498	0.11433
Ratios.....	0.31	0.59	1.12	1.57	1.16	1.17	1.09	...
Decreasing.....	0.05697	0.09353	0.10583	0.16121	0.16206	0.11509	0.13321	0.11826
Ratios.....	0.48	0.79	0.90	1.37	1.37	0.97	1.13	...
Ratios of decreasing to increasing } Disturbances	1.60	1.39	0.83	0.89	1.23	0.86	1.07	1.03

TABLE VI.

VERTICAL FORCE—YEAR ENDING JUNE 30.

YEARS.	1854.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Mean. 1856 to 1862.
Without regard to sign	0.33200	0.10774	0.11911	0.23258	0.21285	0.36692	0.28083	0.20206	0.21744
Ratios	1.53	0.50	0.55	1.07	0.98	1.69	1.29	0.93	...
Increasing	0.14439	0.04124	0.05334	0.11612	0.12198	0.16678	0.14150	0.10253	0.10621
Ratios	1.36	0.39	0.50	1.09	1.15	1.57	1.33	0.97	...
Decreasing	0.18761	0.06650	0.06577	0.11646	0.09087	0.20014	0.13933	0.09953	0.11123
Ratios	1.69	0.60	0.59	1.05	0.82	1.80	1.25	0.89	...
Ratios of decreasing to in- creasing Disturbances }	1.30	1.61	1.23	1.00	0.74	1.20	0.98	0.97	1.05

TORONTO MAGNETICAL OBSERVATIONS.

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TABLE VII.

Aggregate values of the Magnetic Disturbances distributed into the different years of their occurrence, with the ratios which they bear to the mean of the aggregates, from 1856 to 1862 inclusive.

TOTAL FORCE—YEAR ENDING DECEMBER 31.

YEARS.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Mean. 1856 to 1862.
Without regard to sign	0.04972	0.10205	0.17542	0.25392	0.24730	0.18714	0.20154	0.17387
Ratios	0.28	0.59	1.01	1.46	1.42	1.08	1.16	
Increasing	0.01416	0.03293	0.07831	0.11480	0.08996	0.09165	0.08241	0.07203
Ratios	0.20	0.46	1.09	1.59	1.25	1.27	1.14	
Decreasing	0.03556	0.06912	0.09711	0.13912	0.15734	0.09549	0.11913	0.10184
Ratios	0.35	0.68	0.95	1.36	1.54	0.94	1.17	
Ratios of decreasing to increasing } disturbances	2.51	2.10	1.24	1.21	1.75	1.04	1.44	1.41

TABLE VIII.

TOTAL FORCE—YEAR ENDING JUNE 30.

YEARS.	1854.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Mean. 1856 to 1862.
Without regard to sign.....	0.23559	0.05247	0.06774	0.17262	0.15233	0.28453	0.23529	0.14017	0.15788
Ratios	1.49	0.33	0.43	1.09	0.96	1.80	1.49	0.89	
Increasing	0.08922	0.01441	0.02358	0.07132	0.07319	0.10626	0.10272	0.06273	0.06489
Ratios	1.37	0.22	0.36	1.10	1.13	1.64	1.58	0.97	
Decreasing	0.14637	0.03806	0.04416	0.10130	0.07914	0.17827	0.13257	0.07744	0.09299
Ratios	1.57	0.41	0.47	1.09	0.85	1.92	1.43	0.83	
Ratios of decreasing to increasing dis- } turbances	1.64	2.64	1.87	1.42	1.08	1.68	1.29	1.23	1.43

TABLE IX.

INCLINATION—YEAR ENDING DECEMBER 31.

YEARS.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Mean. 1856 to 1862.
Without regard to sign	15430	24376	46761	60842	51106	36425	39999	39277
Ratios	0.39	0.62	1.19	1.55	1.30	0.93	1.02	
Increasing	10299	19725	36504	47997	39482	29179	29780	30424
Ratios	0.34	0.65	1.20	1.58	1.30	0.96	0.98	
Decreasing	5131	4651	10257	12845	11624	7246	10219	8853
Ratios	0.58	0.53	1.16	1.45	1.31	0.82	1.15	
Ratios of increasing to decreasing } disturbances	2.01	4.24	3.56	3.74	3.40	4.03	2.91	3.44

TABLE X.

INCLINATION—YEAR ENDING JUNE 30.

YEARS.	1854.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Mean. 1856 to 1862.
Without regard to sign.....	27849	15568	13087	43542	38464	67406	46377	30835	36468
Ratios	0.76	0.43	0.36	1.19	1.05	1.85	1.27	0.85	
Increasing	21262	10135	10480	34291	30165	52516	36384	24204	28311
Ratios	0.75	0.36	0.37	1.21	1.07	1.85	1.29	0.85	
Decreasing	6587	5433	2607	9251	8299	14890	9993	6631	8158
Ratios	0.80	0.67	0.32	1.13	1.02	1.83	1.22	0.81	
Ratios of increasing to decreasing dis- } turbances	3.23	1.87	4.02	3.71	3.63	3.53	3.64	3.65	3.47

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TABLE XI.

Aggregate values of the disturbances in the different years each ending June 30, and derived from six observations each day.

Years.	DECLINATION.			HORIZONTAL FORCE In parts of the Hor. F.			VERTICAL FORCE In parts of the V. F.			TOTAL FORCE In parts of the T. F.			INCLINATION.		
	Total.	Easterly.	Westerly.	Total.	Increasing.	Decreasing.	Total.	Increa- sing.	Decreasing.	Total.	Increa- sing.	Decreasing.	Total.	Increa- sing.	Decreasing.
1844.....	614	...	...	.1779	.0458	.1321	.1134	.0473	.0661	.1143	.0480	.0663	154.8	...	...
1845.....	702	...	...	.1528	.0286	.1287	.0994	.0325	.0669	.0699	.0155	.0540	188.0	...	...
1846.....	771	...	...	.2015	.0447	.1568	.1383	.0588	.0745	.1008	.0420	.0592	175.0	...	...
1847.....	1873	...	...	.3986	.0597	.3889	.2226	.0646	.1580	.1940	.0422	.1518	308.4	...	...
1848.....	1582	...	...	.9342	.1161	.8181	.3099	.1624	.1475	.2725	.1123	.1602	789.4	...	...
1849-53.	Not published														
1854.....	1494	846	648	.5297	.1051	.4246	.3320	.1444	.1876	.2356	.0892	.1464	464.2	354.4	109.8
1855.....	Observations suspended.														
1856.....	866	154	212	.2974	.0912	.2062	.1077	.0412	.0665	.0525	.0144	.0381	259.5	168.9	90.6
1857.....	423	293	130	.2578	.0470	.2108	.1191	.0533	.0658	.0677	.0236	.0441	218.1	174.7	43.4
1858.....	931	612	349	.8531	.1811	.6720	.2326	.1161	.1165	.1726	.0718	.1018	725.7	571.5	154.2
1859.....	1200	792	408	.7480	.1671	.5819	.2129	.1220	.0909	.1523	.0732	.0791	641.1	502.8	138.3
1860.....	1698	882	816	1.3436	.2886	1.0550	.3669	.1668	.2001	.2845	.1062	.1783	1123.4	875.3	248.1
1861.....	1465	758	707	.9377	.2134	.7243	.2808	.1415	.1393	.2353	.1027	.1326	772.9	606.4	166.5
1862.....	1118	570	548	.5740	.1178	.4562	.2020	.1025	.0995	.1401	.0627	.0774	513.9	403.4	110.5

TABLE XII.

Ratios of the aggregate values of the disturbances in different years (each ending June 30) to the average of the aggregate values of the seven years ending June 30, 1862.

YEARS.	DECLINATION.			HORIZONTAL FORCE.			VERTICAL FORCE.			TOTAL FORCE.			INCLINATION.		
	Total.	Easterly.	Westerly	Total.	Increas- ing.	Decreas- ing.	Total.	Increas- ing.	Decreas- ing.	Total.	Increas- ing.	Decreas- ing.	Total.	Increas- ing.	Decreas- ing.
1844	0.59	...	...	0.25	0.29	0.24	0.52	0.45	0.59	0.72	0.70	0.72	0.25	...	...
1845	0.68	...	...	0.21	0.15	0.23	0.46	0.31	0.60	0.44	0.28	0.58	0.23	...	...
1846	0.75	...	...	0.28	0.28	0.28	0.61	0.55	0.67	0.64	0.65	0.64	0.29	...	...
1847	1.33	...	...	0.56	0.38	0.61	1.02	0.61	1.42	1.23	0.65	1.63	0.50	...	...
1848	1.53	...	...	1.30	0.73	1.47	1.43	1.53	1.33	1.73	1.73	1.72	1.30	...	...
1849	Observations not yet published.														
1850															
1851															
1852															
1853															
1854	1.45	1.46	1.43	0.74	0.67	0.76	1.53	1.36	1.69	1.49	1.37	1.57	0.76	0.75	0.80
1855	Observations suspended.														
1856	0.35	0.27	0.47	0.41	0.58	0.37	0.50	0.39	0.60	0.33	0.22	0.41	0.43	0.36	0.67
1857	0.41	0.51	0.29	0.36	0.30	0.38	0.55	0.50	0.59	0.43	0.36	0.47	0.36	0.37	0.32
1858	0.93	1.05	0.77	1.19	1.15	1.20	1.07	1.09	1.05	1.09	1.10	1.09	1.19	1.21	1.13
1859	1.16	1.36	0.90	1.05	1.06	1.04	0.98	1.15	0.82	0.96	1.13	0.85	1.05	1.07	1.02
1860	1.64	1.52	1.80	1.88	1.83	1.89	1.69	1.57	1.80	1.80	1.64	1.92	1.85	1.85	1.83
1861	1.42	1.31	1.56	1.31	1.85	1.30	1.29	1.33	1.25	1.49	1.58	1.43	1.27	1.29	1.22
1862	1.08	0.98	1.21	0.80	0.75	0.82	0.93	0.97	0.89	0.89	0.97	0.83	0.85	0.85	0.81

TORONTO MAGNETICAL OBSERVATIONS.

TABLE XIII.

AGGREGATE VALUES OF THE DISTURBANCES OF DECLINATION DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratios.	Months.
January .....	...	96.6	...	0.0	0.0	20.5	61.6	34.5	175.3	103.5	395.4	0.59	January.
February .....	...	219.7	...	46.4	12.1	45.3	115.0	98.5	59.3	32.6	409.2	0.61	Feb.
March .....	...	174.6	...	11.7	12.8	126.8	76.3	2 2.1	147.7	56.6	644.0	0.96	March.
April .....	...	205.5	...	19.7	12.6	65.5	148.2	140.4	93.3	132.4	612.1	0.91	April.
May .....	...	97.6	...	45.4	98.4	73.3	94.6	104.6	81.7	85.3	583.3	0.87	May.
June .....	...	66.3	...	34.0	5.5	122.4	74.6	61.8	18.8	33.8	350.9	0.52	June.
July	158.7	...	...	60.4	46.3	116.7	145.7	216.2	39.1	105.7	730.1	1.08	July.
August	73.3	...	26.5	80.4	22.4	29.6	116.0	327.3	218.0	274.2	1067.9	1.58	August.
September	143.2	...	40.8	66.5	105.6	146.9	398.3	181.3	110.5	179.4	1188.5	1.76	Sept.
October	104.9	...	74.6	39.3	63.4	148.0	187.4	111.4	142.6	268.4	960.5	1.42	October.
November	40.6	...	37.4	20.1	147.2	54.4	56.0	12.5	45.4	80.3	415.9	0.62	Nov.
December	112.5	...	0.0	15.4	122.7	134.4	142.7	40.3	118.3	160.3	734.1	1.09	Dec.

TABLE XIV.

AGGREGATE VALUES OF THE EASTERLY DISTURBANCES OF DECLINATION DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratios.	Months.
January .....	...	41.1	...	0.0	0.0	0.0	47.3	22.9	48.4	63.0	181.6	0.49	January.
February .....	...	137.1	...	13.4	0.0	32.5	55.9	34.0	35.5	18.1	189.4	0.51	Feb.
March .....	...	96.9	...	5.9	7.3	115.4	46.0	137.6	116.9	22.8	451.9	1.22	March.
April .....	...	96.2	...	19.7	0.0	35.7	93.8	63.1	60.0	72.2	344.5	0.93	April.
May .....	...	80.4	...	23.8	63.3	66.7	65.2	71.2	52.2	35.4	377.8	1.02	May.
June .....	...	45.5	...	19.3	5.5	100.8	61.4	56.7	6.2	22.4	272.3	0.73	June.
July	122.6	...	...	54.8	29.4	89.7	73.8	130.8	17.2	79.2	474.9	1.28	July.
August	54.2	...	14.4	53.6	22.4	17.5	74.4	176.7	145.9	155.8	646.3	1.74	August.
September	91.6	...	20.1	61.4	64.3	111.1	198.9	76.0	73.1	78.2	663.0	1.78	Sept.
October	28.3	...	27.3	18.8	42.7	104.2	32.3	32.9	23.7	81.3	335.9	0.90	October.
November	16.3	...	0.0	20.1	72.0	34.4	38.6	6.9	20.9	29.7	222.6	0.60	Nov.
December	35.5	...	0.0	8.6	30.1	65.3	78.5	15.4	55.2	48.6	301.7	0.81	Dec.

TABLE XV.

AGGREGATE VALUES OF THE WESTERLY DISTURBANCES OF DECLINATION DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratios.	Months.
January .....	...	55.5	...	0.0	0.0	20.5	14.3	11.6	126.9	40.5	213.8	0.71	January.
February .....	...	82.6	...	33.0	12.1	12.8	59.1	64.5	23.8	14.5	219.8	0.73	Feb.
March .....	...	77.7	...	5.8	5.5	11.4	30.3	74.5	30.8	33.8	192.1	0.64	March.
April .....	...	109.3	...	0.0	12.6	29.8	54.4	77.3	33.3	60.2	267.6	0.88	April.
May .....	...	17.2	...	21.6	35.1	6.6	29.4	33.4	29.5	49.9	205.5	0.68	May.
June .....	...	20.8	...	14.7	0.0	21.6	13.2	5.1	12.6	11.4	78.6	0.26	June.
July	36.1	...	...	5.6	16.9	27.0	71.9	85.4	21.9	26.5	265.2	0.84	July.
August	19.1	...	12.1	26.8	0.0	12.1	41.6	150.6	72.1	118.4	421.6	1.39	August.
September	51.6	...	20.7	5.1	41.3	35.8	199.4	105.3	37.4	101.2	525.5	1.74	Sept.
October	76.6	...	47.3	20.5	20.7	43.8	155.1	78.5	118.9	187.1	624.6	2.06	October.
November	24.3	...	37.4	0.0	75.2	20.0	17.4	5.6	24.5	50.6	193.3	0.64	Nov.
December	77.0	...	0.0	6.8	92.6	69.1	64.2	24.9	63.1	111.7	432.4	1.43	Dec.

TABLE XVI.

AGGREGATE VALUES OF THE DISTURBANCES OF HORIZONTAL FORCE DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratios.	Months.
January .....	...	0.02323	...	0.03755	0.01288	0.04618	0.02611	0.02881	0.11729	0.05757	0.32639	0.72	January.
February .....	...	04331	...	02569	00332	03303	06908	04886	03800	03477	25275	0.56	Feb.
March .....	...	06625	...	03725	01464	10311	03585	19866	06080	02537	47568	1.06	March.
April .....	...	07020	...	02658	00580	11824	11786	10316	04293	04813	46270	1.03	April.
May .....	...	03278	...	01658	09260	05959	03224	06628	04983	05151	36863	0.82	May.
June .....	...	01329	...	01985	00000	14906	06078	04950	05683	03027	36629	0.81	June.
July	0.07015	...	...	01619	03100	08315	06367	12433	04148	08518	44500	0.99	July.
August	01846	...	...	03284	00780	04358	10931	20076	04915	13105	57449	1.27	August.
Sep.	06641	...	0.02597	02525	06126	09343	30323	14874	03649	08021	76861	1.71	Sept.
October	02658	...	03968	03332	02738	11621	21073	04086	08524	14699	66073	1.47	October.
Nov.	04072	...	01717	00504	04956	02727	04480	01355	03880	03034	20936	0.46	Nov.
Dec.	03838	...	00780	01595	14691	04347	11664	04382	07527	05518	49724	1.10	Dec.

TABLE XVII.

AGGREGATE VALUES OF THE DISTURBANCES INCREASING THE HORIZONTAL FORCE,
DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratios.	Months.
January...	...	0.00000	...	0.01124	0.00288	0.00444	0.00279	0.00950	0.00420	0.00562	0.04067	0.40	January.
February...	...	01396	...	00806	00000	00133	00771	00301	00479	00614	03104	0.31	February.
March.....	...	00697	...	01682	00000	01334	01035	03037	01381	00476	08945	0.89	March.
April.....	...	00670	...	00174	00188	03747	02676	03257	01961	00935	12938	1.29	April.
May.....	...	01556	...	00466	01622	02075	00807	01955	02228	01879	11032	1.10	May.
June.....	...	00576	...	01498	00000	04479	02381	01757	01905	01705	13725	1.37	June.
July.....	0.02920	...	...	00873	01057	01739	03012	02176	02238	04119	15214	1.52	July.
August....	00781	...	...	00877	00594	01813	00705	04537	01023	02839	12388	1.23	August.
September	00124	...	0.00317	00287	01455	01793	06285	03034	00788	01435	15077	1.50	Sept.
October...	00289	...	01185	00418	00000	02387	03994	00138	00455	03261	10643	1.06	October.
November	00493	...	00182	00151	00695	00508	00489	00537	00000	00134	02514	0.25	Nov.
December.	01010	...	00599	00000	02094	00520	03120	02547	01118	01371	10770	1.07	Dec.

TABLE XVIII.

AGGREGATE VALUES OF THE DISTURBANCES DECREASING THE HORIZONTAL FORCE,
DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratios.	Months.
January...	...	0.02323	...	0.02631	0.01000	0.04174	0.02332	0.01931	0.11309	0.05195	0.28572	0.82	January.
February...	...	02935	...	01763	00332	03170	06137	04585	03321	02863	22171	0.63	February.
March.....	...	05928	...	02043	01464	08977	02550	16829	04699	02061	38623	1.10	March.
April.....	...	06350	...	02484	00392	08077	09110	07059	02332	03878	33332	0.95	April.
May.....	...	01722	...	01192	07638	03884	02417	04673	02755	03272	25831	0.74	May.
June.....	...	00753	...	00487	00000	10427	03697	03193	03778	01322	22904	0.65	June.
July.....	0.04095	...	...	00746	02043	06576	03355	10257	01910	04399	29286	0.84	July.
August...	01065	...	...	02407	00186	02545	10226	15539	03892	10266	45061	1.29	August.
September	08617	...	0.02280	02238	06671	07550	24038	11840	02861	06586	61784	1.76	Sept.
October...	02369	...	02783	02914	02738	09234	17079	03948	08079	11438	55430	1.58	October.
November	03579	...	01535	00353	04261	02219	03991	00818	03880	02900	18422	0.53	Nov.
December.	02828	...	00181	01595	12597	03827	08544	01835	06409	04147	38954	1.11	Dec.

TORONTO MAGNETICAL OBSERVATIONS.

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TABLE XIX.

AGGREGATE VALUES OF THE DISTURBANCES OF VERTICAL FORCE DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratio.	Months.
January...		0.02590		0.00703	0.01216	0.00694	0.02459	0.00617	0.03640	0.01524	0.10853	0.80	January.
February...		03199		01313	00694	01642	01626	01896	01691	00869	09731	0.72	February.
March.....		04179		00901	01510	03303	02180	04620	03154	01584	17252	1.27	March.
April.....		04223		00443	00641	03176	03566	03345	02437	01816	15424	1.14	April.
May.....		02472		00588	02393	01372	01255	02072	01565	02196	11441	0.84	May.
June.....		01404		00701	00850	04320	01300	02492	01220	01106	11989	0.88	June.
July.....	0.01846			00325	01366	02011	03185	02905	02375	02080	14747	1.09	July.
August...	01859		0.02076	00654	00481	01116	02424	04525	01887	02931	14018	1.03	August.
September	03424		00732	00713	01886	01689	06234	03492	01320	02898	18232	1.34	September
October...	02375		01175	01180	00439	02035	06333	01992	02068	05252	19299	1.42	October.
November.	02535		00452	00283	02462	00949	01366	00553	01371	01500	08484	0.63	November.
December.	03094		00641	00952	02117	01099	02108	00909	02090	02063	11338	0.84	December.

TABLE XX.

AGGREGATE VALUES OF THE DISTURBANCES INCREASING THE VERTICAL FORCE DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratio.	Months.
January...		0.01218		0.00147	0.00629	0.00436	0.01877	0.00228	0.02053	0.01042	0.06412	0.96	January.
February...		01739		00646	00289	01069	00758	00725	00969	00518	04974	0.75	February.
March.....		02250		00235	01344	02246	01136	01421	01765	00665	08812	1.32	March.
April.....		01604		00332	00273	01807	02342	01550	01549	01024	08877	1.33	April.
May.....		00656		00098	00645	00565	00812	01058	00604	00898	04680	0.70	May.
June.....		00482		00256	00309	02266	00839	01545	00525	00262	06002	0.90	June.
July.....	0.00834			00540	00619	01171	01566	01067	01859	01622	08444	1.27	July.
August...	00499		0.01104	00199	00150	00715	01481	02191	00506	00834	06076	0.91	August.
September	01130		00317	00283	00599	00935	03550	01499	00798	00916	08580	1.29	September
October...	01505		00431	00432	00139	00902	02290	01072	00777	02889	08501	1.27	October.
November.	01174		00064	00089	00684	00316	00578	00284	00516	00899	03366	0.50	November.
December.	01348		00081	00302	01032	00395	00686	00572	01388	00929	05304	0.80	December.

TABLE XXI.

AGGREGATE VALUES OF THE DISTURBANCES DECREASING THE VERTICAL FORCE DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratios.	Months.
January...	...	0.01372	...	0.00556	0.00587	0.00258	0.00582	0.00389	0.01587	0.00482	0.04441	0.64	January.
February.	...	01460	...	00667	00405	00573	00868	01171	00722	00351	04757	0.69	February.
March .....	...	01929	...	00666	00166	01057	01044	03199	01389	00919	08440	1.22	March.
April .....	...	02619	...	00111	00368	01369	01224	01795	00888	00792	06547	0.95	April.
May .....	...	01816	...	00490	01748	00807	00443	01014	00961	01298	06761	0.98	May.
June .....	...	00922	...	00445	00541	02054	00461	00947	00695	00844	05987	0.87	June.
July	0.01012	...	...	00285	00747	00840	01619	01838	00516	00458	06303	0.91	July.
August ...	01360	...	0.00972	00455	00331	00401	00943	02334	01381	02097	07942	1.15	August.
September	02294	...	00415	00430	01287	00754	02684	01993	00522	01982	09652	1.40	September
October ...	00870	...	00744	00748	00300	01133	04043	00920	01291	02363	10798	1.57	October.
November	01361	...	00388	00194	01778	00633	00788	00269	00855	00601	05118	0.74	November.
December.	01746	...	00560	00650	01085	00704	01422	00337	00702	01134	06034	0.87	December.

TABLE XXII.

AGGREGATE VALUES OF THE DISTURBANCES OF THE TOTAL FORCE DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratios.	Months.
January...	...	0.01386	...	0.00451	0.00592	0.00379	0.01840	0.00301	0.02755	0.01049	0.07367	0.73	January.
February.	...	02170	...	00843	00297	00987	01389	01456	01244	00471	06687	0.66	February.
March .....	...	03284	...	00513	00886	02520	01241	04241	02642	01087	13130	1.29	March.
April .....	...	03623	...	00184	00283	02659	03115	02490	01996	01358	12069	1.19	April.
May .....	...	01577	...	00297	01959	01084	00645	01611	01327	01695	08618	0.85	May.
June .....	...	00763	...	00183	00280	03705	00795	01987	00921	00528	08399	0.83	June.
July	0.01391	...	...	00365	00898	01759	02559	02568	01654	01694	11497	1.13	July.
August ...	01057	...	...	00594	00251	00624	01293	04642	01525	02665	11584	1.14	August.
September	02904	...	0.00516	00222	01635	01241	05636	03265	00830	02348	15177	1.50	September
October ...	01596	...	00702	00989	00000	01343	04992	01377	01840	04826	15367	1.52	October.
November	01783	...	00143	00043	01553	00567	00661	00216	00665	01006	04711	0.47	November.
December.	02045	...	00433	00294	01591	00674	01226	00576	01315	01427	07103	0.70	December.

TABLE XXIII.

AGGREGATE VALUES OF THE DISTURBANCES INCREASING THE TOTAL FORCE DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratio.	Months.
January ...	...	0.00592	...	0.00051	0.00408	0.00237	0.01255	0.00044	0.01338	0.00642	0.03975	0.95	January.
February ..	...	01236	...	00355	00141	00630	00463	00388	00623	00317	02917	0.69	February.
March ....	...	01617	...	00100	00886	01481	00553	00851	01410	00292	05573	1.33	March.
April .....	...	01081	...	00116	00043	01308	01824	00973	01274	00639	06177	1.47	April.
May .....	...	00405	...	00113	00255	00348	00419	00721	00481	00635	02972	0.71	May.
June .....	...	00194	...	00056	00000	01568	00546	01229	00356	00065	03820	0.91	June.
July	0.00595	...	...	00177	00457	01006	01665	00634	01297	01251	06487	1.54	July.
August ...	00144	...	...	00145	00050	00321	00476	01854	00358	00592	03796	0.90	August.
September	00504	...	0.00234	00000	00322	00523	02586	01060	00443	00563	05497	1.31	September
October ...	01069	...	00144	00257	00000	00310	01397	00690	00409	02211	05274	1.26	October.
November	00649	...	00000	00000	00320	00047	00253	00116	00203	00543	01482	0.35	November
December.	00836	...	00043	00046	00411	00052	00043	00436	00973	00491	02452	0.58	December.

TABLE XXIV.

AGGREGATE VALUES OF THE DISTURBANCES DECREASING THE TOTAL FORCE DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratio.	Months.
January ...	...	0.00794	...	0.00400	0.00184	0.00142	0.00585	0.00257	0.01417	0.00407	0.03392	0.57	January.
February ..	...	00934	...	00484	00156	00357	00926	01068	00621	00154	03770	0.63	February.
March .....	...	01647	...	00413	00000	01039	00688	03390	01232	00795	07557	1.27	March.
April .....	...	02542	...	00072	00220	01351	01291	01517	00722	00719	05892	0.99	April.
May .....	...	01172	...	00184	01704	00736	00226	00890	00846	01060	05646	0.95	May.
June .....	...	00569	...	00127	00280	02137	00249	00758	00565	00463	04579	0.77	June.
July	0.00796	...	...	00188	00441	00753	00894	01934	00357	00443	05010	0.84	July.
August ...	00913	...	...	00439	00201	00303	00817	02788	01167	02073	07788	1.31	August.
September	02400	...	0.00282	00222	01313	00718	03050	02205	00387	01785	09680	1.63	September
October ...	00527	...	00558	00732	00000	01033	03595	00687	01431	02615	10093	1.70	October.
November	01134	...	00143	00043	01233	00520	00408	00100	00462	00463	03229	0.54	November
December.	01209	...	00390	00248	01180	00622	01183	00140	00342	00936	04651	0.78	December.

TABLE XXV.

AGGREGATE VALUES OF THE DISTURBANCES OF INCLINATION DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

Months.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Months.
January	"	"	"	"	"	"	"	"	"	"	"	0.80	January.
February .....	...	2075	...	2410	771	2501	1433	1543	6534	3200	18392	0.58	February.
March .....	...	2616	...	1013	219	1773	3500	2592	2046	2087	13230	1.12	March.
April .....	...	3194	...	2143	1150	6053	1686	9257	3605	1772	25666	0.98	April.
May .....	...	3083	...	1510	298	5713	5877	4548	2104	2360	22410	0.79	May.
June .....	...	2140	...	716	4153	2952	2034	3386	2206	2596	18043	0.79	June.
July .....	...	627	...	1142	0000	6765	2930	2698	2800	1690	18025	0.90	July.
August	3418	...	...	940	1628	3928	2525	5655	2034	4006	20716	1.19	August.
September	919	...	...	1411	507	2224	5876	9035	1879	6318	27250	1.67	September.
October	3826	...	1192	1430	4185	4894	14383	7112	2059	4112	38175	1.52	October.
November	1398	...	2222	1538	1395	5928	12242	2212	4338	7085	34738	0.49	November.
December	2225	...	775	257	2373	1623	2258	835	2312	1503	11161	1.18	December.
	2328	...	466	920	7697	2407	6098	2233	4508	3270	27133		

TABLE XXVI.

AGGREGATE VALUES OF THE DISTURBANCES INCREASING THE INCLINATION, DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

Months.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Months.
January	"	"	"	"	"	"	"	"	"	"	"	0.89	January.
February .....	...	1540	...	1397	627	2273	1280	1051	6312	2955	15895	0.66	February.
March .....	...	1852	...	823	219	1698	3106	2303	1845	1761	11755	1.15	March.
April .....	...	2884	...	1022	1150	5223	1276	7560	2747	1445	20423	0.94	April.
May .....	...	2544	...	1347	202	4137	4850	2967	1256	1829	16588	0.70	May.
June .....	...	1040	...	530	3345	1888	1413	2437	1185	1619	12417	0.64	June.
July .....	...	327	...	243	0	4890	1845	1971	1846	607	11402	0.80	July.
August	2037	...	...	473	1132	3186	1286	4740	983	2310	14110	1.21	August.
September	374	...	...	1063	91	1329	5606	7165	1261	4904	21419	1.72	September.
October	3661	...	1044	1130	3164	3919	11865	5707	1745	3042	30572	1.58	October.
November	1321	...	1554	1239	1395	4709	9087	2146	3943	5589	28108	0.52	November.
December	1941	...	664	193	1792	1195	1984	415	2187	1432	9198	1.19	December.
	1741	...	73	839	6608	2057	4399	1020	3869	2287	21079		

TABLE XXVII.

AGGREGATE VALUES OF THE DISTURBANCES DECREASING THE INCLINATION DISTRIBUTED INTO THE DIFFERENT MONTHS OF THEIR OCCURRENCE.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums 1856 to 1862.	Ratios.	Months.
January	"	"	"	"	"	"	"	"	"	"	"	"	January.
February .....	...	535	...	1013	144	228	153	492	222	245	2497	0.48	February.
March .....	...	764	...	190	0	75	394	289	201	326	1475	0.29	March.
April .....	...	310	...	1121	0	830	410	1697	858	327	5243	1.02	April.
May .....	...	539	...	163	96	1576	1027	1581	848	531	5822	1.13	May.
June .....	...	1100	...	186	808	1064	621	949	1021	977	5626	1.09	June.
July .....	...	300	...	899	0	1875	1085	727	954	1083	6623	1.28	July.
August	1381	...	...	467	496	742	1239	915	1051	1696	6606	1.28	August.
September	545	...	...	348	416	895	270	1870	618	1414	5831	1.13	September.
October	165	...	148	300	1021	975	2518	1405	314	1070	7603	1.47	October.
November	77	...	668	299	0	1219	3155	66	395	1496	6630	1.28	November.
December	284	...	111	64	581	428	274	420	125	71	1963	0.38	December.
	587	...	373	81	1089	350	1699	1213	639	983	6054	1.17	

TABLE XXVIII.

Comparative view of the ratios that express the distribution of the aggregate values of the disturbances in the several months, as derived from the five years ending June 30, 1848, and from the seven years ending December 31, 1862.

			January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
DECLINATION.	1844 to 1848	Total	0.57	0.84	1.11	1.42	0.98	0.53	0.94	1.15	1.62	1.31	0.78	0.76
		Easterly	0.57	0.84	1.15	1.29	0.98	0.75	0.98	1.36	1.63	1.28	0.60	0.57
		Westerly.....	0.57	0.84	1.06	1.59	0.98	0.25	0.89	0.89	1.61	1.35	1.06	0.99
	1856 to 1862	Total	0.59	0.61	0.96	0.91	0.87	0.52	1.08	1.58	1.76	1.42	0.62	1.09
		Easterly	0.49	0.51	1.22	0.93	1.02	0.73	1.28	1.74	1.78	0.90	0.60	0.81
		Westerly.....	0.71	0.73	0.64	0.88	0.68	0.26	0.84	1.39	1.74	2.06	0.64	1.43
HORIZONT. FORCE.	1844 to 1848	Total	0.58	0.94	0.94	1.50	0.90	0.36	0.61	0.75	1.71	1.48	0.98	1.28
		Increasing .....	...	...	...	...	...	...	...	...	...	...	...	...
		Decreasing .....	...	...	...	...	...	...	...	...	...	...	...	...
	1856 to 1862	Total	0.72	0.56	1.06	1.03	0.82	0.81	0.99	1.27	1.71	1.47	0.46	1.10
		Increasing	0.40	0.31	0.89	1.29	1.10	1.37	1.52	1.23	1.50	1.06	0.25	1.07
		Decreasing.....	0.82	0.63	1.10	0.95	0.74	0.65	0.84	1.29	1.76	1.58	0.53	1.11
VERTICAL FORCE.	1844 to 1848	Total	0.56	0.74	1.08	1.49	1.12	0.50	0.71	1.08	1.60	1.29	0.75	1.00
		Increasing	0.71	0.77	1.21	1.46	0.99	0.51	0.55	0.76	1.49	1.25	0.82	1.48
		Decreasing.....	0.45	0.69	0.98	1.55	1.22	0.50	0.95	1.31	1.65	1.33	0.68	0.63
	1856 to 1862	Total	0.80	0.72	1.27	1.14	0.84	0.88	1.09	1.03	1.34	1.42	0.63	0.84
		Increasing	0.96	0.75	1.32	1.33	0.70	0.90	1.27	0.91	1.29	1.27	0.50	0.80
		Decreasing.....	0.64	0.69	1.22	0.95	0.98	0.87	0.91	1.15	1.40	1.57	0.74	0.87
TOTAL FORCE.	1844 to 1848	Total	0.52	0.74	1.05	1.55	1.08	0.39	0.78	1.06	1.64	1.36	0.77	1.05
		Increasing	0.72	0.70	1.17	1.51	1.08	0.45	0.59	0.65	1.45	1.10	0.89	1.67
		Decreasing	0.43	0.76	0.99	1.56	1.08	0.36	0.88	1.27	1.73	1.49	0.70	0.74
	1856 to 1862	Total	0.73	0.66	1.29	1.19	0.85	0.83	1.13	1.14	1.50	1.52	0.47	0.70
		Increasing	0.95	0.69	1.33	1.47	0.71	0.91	1.54	0.90	1.31	1.26	0.35	0.58
		Decreasing.....	0.57	0.63	1.27	0.99	0.95	0.77	0.84	1.31	1.63	1.70	0.54	0.78
INCLINATION.	1844 to 1848	Total	0.64	0.94	0.97	1.41	0.85	0.39	0.56	0.74	1.67	1.45	1.02	1.37
		Total	0.80	0.58	1.12	0.98	0.79	0.79	0.90	1.19	1.67	1.52	0.49	1.18
	1856 to 1862	Increasing ..	0.89	0.66	1.15	0.94	0.70	0.64	0.80	1.21	1.72	1.58	0.52	1.19
		Decreasing.....	0.48	0.29	1.02	1.13	1.09	1.28	1.28	1.13	1.47	1.28	0.38	1.17

TABLE XXIX.

Aggregate values of the disturbances of declination, distributed into the different hours of their occurrence.

TORONTO ASTRONOMICAL TIME.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	TORONTO CIVIL TIME.
18	47.5	132.6	146.0	313.7	303.9	182.5	386.9	1513.1	1.12	6 a.m.
20	42.0	87.3	145.3	325.0	271.5	252.0	329.3	1452.4	1.07	8
2	49.1	46.9	53.3	150.9	137.8	70.6	112.5	621.1	0.47	2 p.m.
4	34.7	78.6	56.6	120.8	98.4	116.7	97.7	603.5	0.45	4
10	161.6	194.9	278.2	343.5	352.7	317.7	317.3	1965.9	1.46	10
12	104.4	108.7	404.4	362.5	376.6	310.5	268.8	1935.9	1.43	12

Easterly Disturbances.

TORONTO ASTRONOMICAL TIME.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	TORONTO CIVIL TIME.
18	31.8	35.4	35.9	101.4	88.6	51.0	72.5	416.6	0.56	6 a.m.
20	6.8	16.1	26.9	100.3	54.3	26.4	32.6	263.4	0.35	8
2	0.0	30.6	34.5	93.5	78.1	13.7	61.1	311.5	0.42	2 p.m.
4	11.7	18.1	20.1	61.2	56.4	42.9	37.1	247.5	0.33	4
10	161.6	145.8	278.2	306.1	297.1	292.3	307.0	1788.1	2.40	10
12	87.5	91.0	377.7	203.6	249.7	228.9	196.4	1434.8	1.93	12

Westerly Disturbances.

TORONTO ASTRONOMICAL TIME.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	TORONTO CIVIL TIME.
18	15.7	97.2	110.1	212.3	215.3	131.5	314.4	1096.5	1.81	6 a.m.
20	35.2	71.2	118.4	224.7	217.2	225.6	296.6	1189.0	1.97	8
2	49.1	16.3	18.8	57.4	59.7	56.9	51.4	309.6	0.51	2 p.m.
4	23.0	60.5	36.5	59.6	42.0	73.8	60.6	356.0	0.59	4
10	0.0	49.1	0.0	37.4	55.6	25.4	10.3	177.8	0.29	10
12	16.9	17.7	26.7	158.9	126.9	81.6	72.4	501.1	0.83	12

TORONTO MAGNETICAL OBSERVATIONS.

TABLE XXX.

Aggregate values of the Disturbances of Horizontal Force distributed into the different hours of their occurrence.

Toronto Astronomi- cal Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums in the years 1856 to 1862 inclusive.	Ratios.	Toronto Civil Time.
18	0.03979	0.06254	0.13250	0.23095	0.24149	0.07209	0.14105	0.92041	1.02	6 a.m.
20	07205	06581	12645	27327	18251	11197	14285	97441	1.08	8
2	03564	06892	13980	14131	11832	09681	11281	70861	0.79	2 p.m.
4	03912	06781	11106	17459	13411	09360	10474	72453	0.80	4
10	05104	10895	18946	17801	15560	15827	11193	94826	1.05	10
12	05445	11012	21705	19217	23530	15937	16319	1.13165	1.26	12

Disturbances increasing the Horizontal Force.

Toronto Astronomi- cal Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums in the years 1856 to 1862 inclusive.	Ratios.	Toronto Civil Time.
18	0.01105	0.00465	0.02091	0.01295	0.01528	0.01419	0.00877	0.08800	0.44	6 a.m.
20	02364	01352	03197	03173	03678	01744	04604	20412	1.02	8
2	01222	00772	07325	06367	06891	03269	04929	30775	1.53	2 p.m.
4	01450	02628	04528	08409	06590	05127	06356	35038	1.75	4
10	01128	01611	01112	02690	03785	01169	01386	12831	0.64	10
12	01087	01145	02419	03620	01754	01258	01178	12461	0.62	12

Disturbances decreasing the Horizontal Force.

Toronto Astronomi- cal Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums in the years 1856 to 1862 inclusive.	Ratios.	Toronto Civil Time.
18	0.02874	0.05769	0.11159	0.21800	0.22621	0.05790	0.13228	0.83241	1.19	6 a.m.
20	04841	05179	09148	24154	14573	09453	09681	77029	1.10	8
2	02842	05620	06655	07764	04941	06412	06352	40086	0.57	2 p.m.
4	02462	04103	06578	09050	06821	04233	04118	37365	0.53	4
10	03976	08784	17834	15111	11775	14658	09807	81945	1.17	10
12	04358	09867	19286	15597	21776	14679	15141	1.00704	1.44	12

TABLE XXXI.

Aggregate values of the Disturbances of Vertical Force, distributed into the different hours of their occurrence.

Toronto Astronomical Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Toronto Civil Time.
18	0.01948	0.08586	0.08998	0.06626	0.06159	0.08981	0.05437	0.81685	1.17	6 a.m.
20	01908	02277	02765	05484	04050	03017	03066	22565	0.83	8
2	00883	01182	04118	05937	03994	03835	03815	23759	0.87	2 p.m.
4	00719	01819	08990	05749	04958	05468	04787	27480	1.01	4
10	01523	03245	03675	04709	08978	03654	03222	24008	0.88	10
12	02277	08996	04865	05531	06284	04368	05492	33318	1.23	12

Disturbances increasing the Vertical Force.

Toronto Astronomical Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Toronto Civil Time.
18	0.00586	0.00784	0.01048	0.01523	0.01347	0.00694	0.01044	0.06974	0.52	6 a.m.
20	00840	00816	01318	02302	00768	00691	00482	07162	0.54	8
2	00523	00825	03030	05194	08366	03208	03308	19448	1.46	2 p.m.
4	00508	01449	03748	04768	08756	04805	04388	23367	1.75	4
10	00603	01414	02069	02582	02312	02436	01693	13099	0.98	10
12	00555	01424	01627	01546	01663	01480	01683	09978	0.75	12

Disturbances decreasing the Vertical Force.

Toronto Astronomical Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Toronto Civil Time.
18	0.01412	0.02752	0.02952	0.05103	0.04812	0.03287	0.04393	0.24711	1.79	6 a.m.
20	01066	01461	01452	03182	03282	02326	02634	15403	1.12	8
2	00361	00357	01083	00743	00628	00632	00507	04311	0.31	2 p.m.
4	00216	00370	00242	00981	01197	00658	00449	04113	0.30	4
10	00920	01831	01616	02127	01666	01218	01529	10007	0.79	10
12	01722	02572	03238	03986	04621	03388	03809	23435	1.69	12

TABLE XXXII.

Aggregate values of the Disturbances of Total Force, distributed into the different hours of their occurrence.

Toronto Astronomical Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Toronto Civil Time.
18	0.00890	0.02493	0.03212	0.05737	0.05804	0.03177	0.04745	0.26058	1.28	6 a.m.
20	00986	01325	01744	04115	03622	02183	02548	16523	0.81	8
2	00443	00392	02735	04060	02748	02658	02590	15626	0.77	2 p.m.
4	00304	00884	03010	04067	03615	04202	03737	19819	0.98	4
10	00704	02246	02649	02917	03061	02227	02214	16018	0.79	10
12	01645	02865	04192	04496	05880	04267	04320	27665	1.36	12

Disturbances increasing the Total Force.

Toronto Astronomical Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Toronto Civil Time.
18	0.00207	0.00306	0.00311	0.00666	0.00607	0.00273	0.00406	0.02776	0.33	6 a.m.
20	00398	00278	00574	01432	00271	00147	00280	03380	0.40	8
2	00261	00348	02169	03791	02614	02347	02264	13789	1.64	2 p.m.
4	00259	00781	02916	03724	02983	03964	03600	18227	2.17	4
10	00196	00692	01021	01223	01581	01411	01090	07214	0.86	10
12	00095	00893	00840	00644	00940	01023	00601	05036	0.60	12

Disturbances decreasing the Total Force.

Toronto Astronomical Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Toronto Civil Time.
18	0.00683	0.02187	0.02901	0.05071	0.05197	0.02904	0.04339	0.23282	1.96	6 a.m.
20	00588	01047	01170	02683	03351	02036	02268	13143	1.11	8
2	00182	00049	00566	00269	00134	00311	00326	01837	0.15	2 p.m.
4	00045	00103	00094	00343	00632	00238	00137	01592	0.13	4
10	00508	01554	01628	01694	01480	00816	01124	08804	0.74	10
12	01550	01972	03352	03852	04940	03244	03719	22629	1.90	12

TABLE XXXIII.

Aggregate values of the Disturbances of Inclination, distributed into the different hours of their occurrence.

Toronto Astronomical Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Toronto Civil Time.
18	2087	2956	6685	10613	10549	3424	6203	42497	0.93	6 a.m.
20	3921	3504	6374	14154	8321	5763	6614	48651	1.06	8
2	1798	3490	7398	7885	6408	5758	6817	39549	0.86	2 p.m.
4	2177	3747	6110	9067	7172	5266	6139	39678	0.87	4
10	2763	5478	10136	10067	7975	8887	6609	51915	1.13	10
12	2709	5201	10058	9056	10681	7327	7617	52649	1.15	12

Disturbances increasing the Inclination.

Toronto Astronomical Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Toronto Civil Time.
18	1296	2572	5268	9575	9782	2279	5504	36276	1.02	6 a.m.
20	2556	2743	4675	12071	6800	4359	4028	36732	1.03	8
2	1164	3107	3967	5433	3361	4326	4570	25928	0.73	2 p.m.
3	1490	2490	4343	5776	4271	3482	3431	25233	0.71	4
10	1945	4371	9516	8329	6147	8262	5520	44090	1.24	10
12	1848	4442	8735	6813	9621	6471	6727	44657	1.26	12

Disturbances decreasing the Inclination.

Toronto Astronomical Time.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Sums. 1856 to 1862.	Ratios.	Toronto Civil Time.
18	771	384	1417	1038	767	1145	699	6221	0.60	6 a.m.
20	1365	761	1699	2083	2021	1404	2586	11919	1.15	8
2	629	383	3431	2452	3047	1432	2247	13621	1.32	2 p.m.
4	687	1257	1767	3291	2901	1784	2708	14395	1.39	4
10	818	1107	620	1738	1828	625	1089	7825	0.76	10
12	861	759	1323	2243	1060	856	890	7992	0.78	12

TABLE XXXIV.

Ratios of the Aggregate Values of the Magnetic Disturbances at each of the six observation hours, derived from a series of years to the Average Aggregate Value of the six hours.

		6 A. M.	8 A. M.	2 P. M.	4 P. M.	10 P. M.	12 P. M.
Declination.	1844 { Total	1.03	1.25	0.39	0.51	1.51	1.32
	to { Easterly	0.50	0.29	0.23	0.35	2.67	1.96
	1848 { Westerly	1.53	2.17	0.55	0.67	0.38	0.70
	1856 { Total	1.12	1.07	0.47	0.45	1.46	1.43
	to { Easterly	0.56	0.35	0.42	0.33	2.40	1.93
	1862 { Westerly	1.81	1.97	0.51	0.59	0.29	0.83
Horizont. Force.	1844 { Total	1.09	1.21	0.69	0.63	1.07	1.31
	to { Increasing	0.35	0.30	2.08	2.26	0.62	0.39
	1848 { Decreasing	1.22	1.38	0.43	0.33	1.15	1.48
	1856 { Total	1.02	1.08	0.79	0.80	1.05	1.26
	to { Increasing	0.44	1.02	1.53	1.75	0.64	0.62
	1862 { Decreasing	1.19	1.10	0.57	0.53	1.17	1.44
Vertical Force.	1844 { Total	1.20	0.80	0.76	1.03	0.84	1.38
	to { Increasing	0.27	0.41	1.60	2.30	0.91	0.51
	1848 { Decreasing	1.86	1.06	0.16	0.14	0.79	1.99
	1856 { Total	1.17	0.83	0.87	1.01	0.88	1.23
	to { Increasing	0.52	0.54	1.46	1.75	0.98	0.75
	1862 { Decreasing	1.79	1.12	0.81	0.80	0.79	1.69
Total Force.	1844 { Total	1.31	0.88	0.62	0.93	0.79	1.52
	to { Increasing	0.26	0.34	1.65	2.56	2.75	0.44
	1848 { Decreasing	1.87	1.09	0.07	0.07	0.82	2.09
	1856 { Total	1.28	0.81	0.77	0.98	0.79	1.36
	to { Increasing	0.33	0.40	1.64	2.17	0.86	0.60
	1862 { Decreasing	1.96	1.11	0.15	0.13	0.74	1.90
Inclination.	1844 { Total	0.86	1.12	0.89	0.78	1.22	1.13
	to { Easterly						
	1848 { Westerly						
	1856 { Total	0.93	1.06	0.86	0.87	1.13	1.15
	to { Increasing	1.02	1.03	0.78	0.71	1.24	1.26
	1862 { Decreasing	0.60	1.15	1.32	1.39	0.76	0.78

TABLE XXXV.

Distribution into the different months and hours of the ratios expressing the relative amount of the Disturbances of opposite signs, derived from the observations of the seven years terminating December 31, 1862.

MONTHS.	Ratios of Easterly to Westerly Disturbances of declination.	RATIOS OF DISTURBANCES DECREASING THE FORCE TO THOSE THAT INCREASE IT.			Ratios of disturbances that increase to those that decrease the Inclination.
		Horizontal Force.	Vertical Force.	Total Force.	
January	0.85	7.03	0.69	0.86	6.37
February	0.86	7.14	0.96	1.29	7.97
March	2.35	4.32	0.96	1.36	3.90
April	1.29	2.58	0.74	0.95	2.85
May	1.84	2.34	1.44	1.90	2.21
June	3.46	1.67	1.00	1.20	1.72
July	1.86	1.92	0.75	0.77	2.14
August	1.53	3.64	1.31	2.05	3.67
September	1.26	4.10	1.12	1.76	4.02
October	0.54	5.21	1.27	1.91	4.24
November	1.15	7.33	1.52	2.18	4.69
December	0.70	3.62	1.14	1.90	3.48
HOURS.					
18	0.38	9.46	3.54	8.39	5.83
20	0.22	3.77	2.15	3.89	3.08
2	1.01	1.30	0.22	0.13	1.90
4	0.70	1.06	0.18	0.09	1.76
10	10.06	6.36	0.83	1.22	5.63
12	2.86	8.08	2.34	4.49	5.59

TORONTO MAGNETICAL OBSERVATIONS.

TABLE XXXVI.

SOLAR DIURNAL VARIATION OF DECLINATION.

JANUARY.							FEBRUARY.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	+1.16	+2.31	-3.54	-1.27	+1.30	+0.17	1854	+0.59	+2.44	-3.35	-2.25	+2.47	+1.04
1856	+0.48	+2.60	-3.37	-0.33	+0.75	+0.03	1856	+1.26	+2.05	-2.55	-1.42	+1.02	+0.60
1857	+0.52	+1.45	-2.53	-1.19	+1.20	+0.66	1857	+1.35	+1.77	-2.48	-1.71	+1.34	+0.71
1858	+0.41	+2.50	-2.99	-2.20	+1.36	+1.06	1858	+1.53	+3.65	-3.80	-2.73	+1.61	+0.71
1859	+0.81	+4.05	-4.09	-2.02	+0.79	+0.59	1859	+1.64	+3.73	-3.75	-3.45	+1.74	+1.06
1860	+1.38	+3.85	-4.50	-2.82	+1.54	+0.68	1860	+1.80	+4.90	-4.58	-3.68	+0.91	+1.61
1861	+2.32	+3.18	-3.33	-2.58	+0.58	-0.01	1861	+1.41	+1.51	-4.78	-3.30	+1.57	+1.55
1862	+0.82	+2.73	-3.89	-2.43	+1.93	+0.96	1862	+1.99	+4.38	-3.95	-2.51	+0.65	+0.42
1856 to 1862	+0.96	+2.91	-3.53	-1.94	+1.16	+0.57	1856 to 1862	+1.57	+3.57	-3.70	-2.69	+1.26	+0.95

MARCH.							APRIL.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	+1.84	+4.10	-4.88	-3.48	+1.11	+1.54	1854	+3.80	+3.64	-5.37	-2.80	+0.68	+0.96
1856	+1.71	+3.75	-4.16	-2.10	+0.38	+0.64	1856	+3.46	+5.03	-5.53	-3.17	+0.20	+0.92
1857	+1.71	+3.52	-5.35	-1.70	+1.31	+0.73	1857	+4.07	+4.54	-5.90	-3.13	+0.43	+0.90
1858	+2.64	+5.17	-5.91	-3.41	+0.79	+0.93	1858	+3.76	+6.02	-6.39	-3.69	+0.40	+0.84
1859	+2.52	+5.76	-6.58	-4.88	+0.71	+2.69	1859	+1.50	+7.95	-8.14	-4.43	-0.48	+1.52
1860	+2.82	+5.63	-6.46	-4.45	+1.70	+0.97	1860	+3.34	+6.26	-6.95	-4.32	+0.85	+1.74
1861	+2.86	+6.21	-6.27	-3.83	+0.73	+0.50	1861	+4.20	+7.74	-7.73	-4.96	+0.35	+1.31
1862	+1.87	+5.54	-5.20	-2.62	+0.27	+0.35	1862	+2.99	+6.12	-6.71	-2.90	+0.33	+1.06
1856 to 1862	+2.30	+5.08	-5.70	-3.28	+0.84	+0.97	1856 to 1862	+3.76	+6.24	-6.76	-3.80	+0.30	+1.18

MAY.							JUNE.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	+5.47	+5.01	-5.21	-3.28	+0.45	+0.04	1854	+5.69	+4.87	-5.81	-4.25	+0.63	+0.77
1856	+4.32	+5.06	-5.43	-2.71	+0.35	+0.92	1856	+5.28	+5.39	-5.39	-3.29	-0.33	+0.24
1857	+5.41	+5.82	-5.77	-3.22	+0.06	+0.21	1857	+5.37	+5.80	-5.82	-3.33	-0.35	+0.25
1858	+5.30	+5.76	-5.41	-2.90	-0.65	+0.41	1858	+4.91	+5.32	-5.24	-3.85	+0.34	+1.45
1859	+6.26	+6.83	-7.07	-3.77	+0.38	-0.14	1859	+6.38	+7.66	-7.37	-4.10	-0.37	-0.27
1860	+5.81	+6.55	-6.88	-3.06	-0.08	+0.16	1860	+7.20	+7.41	-6.57	-3.80	-1.51	-0.79
1861	+4.96	+6.88	-6.28	-4.18	+0.12	+1.52	1861	+5.48	+8.18	-6.92	-4.49	-0.17	-0.16
1862	+4.80	+5.93	-6.48	-3.05	+0.35	+0.95	1862	+5.95	+6.81	-7.27	-4.39	+0.17	+0.64
1856 to 1862	+5.27	+6.05	-6.19	-3.27	+0.07	+0.58	1856 to 1862	+5.80	+6.65	-6.51	-3.89	-0.31	+0.19

TABLE XXXVI.—(Continued.)

SOLAR DIURNAL VARIATION OF DECLINATION.

JULY.							AUGUST.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	+5.85	+7.53	-6.72	-4.46	+0.04	+0.01	1853	+6.02	+6.74	-6.74	-3.84	+1.01	+0.68
1856	+4.67	+6.11	-5.83	-3.69	+0.16	+0.84	1855	+5.60	+5.91	-5.80	-2.46	+0.19	+0.40
1857	+5.32	+6.16	-6.41	-3.97	-0.17	+1.30	1856	+4.73	+6.24	-6.02	-2.53	+0.74	+0.67
1858	+5.38	+6.35	-6.27	-4.26	+0.45	+0.61	1857	+5.69	+7.12	-6.26	-2.96	-0.03	+0.29
1859	+6.54	+7.95	-7.42	-4.40	-0.45	+0.01	1858	+5.37	+7.84	-7.59	-3.76	+0.91	+1.08
1860	+6.64	+8.24	-8.31	-4.58	-0.57	+0.83	1859	+6.41	+9.60	-8.55	-3.07	-0.49	+0.06
1861	+5.46	+6.94	-6.18	-3.75	-0.39	+0.19	1860	+7.33	+10.64	-8.40	-4.42	-0.99	-0.30
1862	+5.83	+7.53	-6.71	-3.83	-0.83	+0.25	1861	+6.09	+7.69	-7.70	-3.49	+0.39	+0.88
...	...	...	...	...	...	...	1862	+6.29	+7.55	-7.50	-3.06	-0.09	+0.67
1856 to 1862 }	+5.69	+7.04	-6.73	-4.07	-0.26	+0.58	1856 to 1862 }	+5.99	+8.10	-7.45	-3.33	+0.06	+0.48

SEPTEMBER.							OCTOBER.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	+4.15	+5.25	-4.43	-1.57	+0.28	0.00	1853	+2.70	+4.40	-4.95	-2.54	+0.48	+0.69
1855	+4.88	+5.12	-5.10	-1.71	+0.35	+0.14	1855	+1.22	+3.17	-3.41	-1.22	+0.96	+0.08
1856	+4.26	+4.52	-4.67	-1.15	+0.97	-0.25	1856	+1.39	+3.44	-3.24	-1.12	+0.79	-0.46
1857	+5.17	+5.15	-5.10	-1.69	+0.07	+0.07	1857	+1.92	+3.86	-3.99	-1.95	+0.22	+0.74
1858	+4.74	+6.73	-5.89	-2.51	+0.19	+0.42	1858	+2.09	+5.20	-5.29	-2.78	+1.58	0.00
1859	+4.64	+8.60	-6.30	-2.79	-0.40	-0.06	1859	+1.37	+5.85	-5.37	-3.33	+1.28	+0.99
1860	+5.30	+6.98	-5.89	-2.17	-1.17	+0.63	1860	+2.30	+5.18	-5.40	-3.13	+0.66	+1.20
1861	+4.75	+6.47	-6.18	-1.98	-0.09	+0.69	1861	+2.04	+4.26	-4.80	-2.38	+0.84	+0.83
1862	+5.05	+6.09	-5.79	-2.17	+0.17	+0.34	1862	+1.60	+5.66	-5.84	-2.80	-1.85	+0.32
1856 to 1862 }	+4.84	+6.36	-5.69	-2.07	-0.04	+0.26	1856 to 1862 }	+1.82	+4.78	-4.85	-2.50	+0.50	+0.52

NOVEMBER.							DECEMBER.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	+1.94	+2.91	-3.64	-1.60	+1.22	-0.02	1853	+0.34	+1.38	-3.13	-2.16	+0.40	+1.21
1855	+1.09	+2.32	-3.03	-1.63	+1.82	+0.24	1855	+0.36	+1.42	-2.43	-1.02	+0.51	-0.09
1856	+1.51	+2.34	-2.86	-0.94	+0.58	+0.19	1856	+0.34	+1.03	-2.53	-1.43	+0.74	+0.62
1857	+1.20	+4.01	-4.11	-1.76	+0.95	+0.57	1857	+0.16	+1.81	-3.10	-1.48	+0.96	+0.41
1858	+2.21	+2.55	-3.61	-2.43	+1.09	+1.02	1858	+1.04	+2.43	-4.10	-2.74	+1.57	+0.55
1859	+2.61	+4.00	-4.58	-2.91	+0.89	+0.79	1859	+1.18	+2.48	-4.33	-3.46	+1.37	+1.51
1860	+1.94	+3.16	-4.12	-2.27	+0.74	+1.38	1860	+1.09	+2.24	-3.06	-1.81	+0.39	-0.09
1861	+1.73	+2.72	-4.32	-2.43	+1.81	+1.33	1861	+0.99	+1.82	-3.74	-2.06	+0.98	+0.78
1862	+1.77	+2.50	-3.79	-2.20	+1.52	+1.04	1862	+0.29	+2.23	-3.48	-1.96	+1.26	+0.42
1856 to 1862 }	+1.85	+3.04	-3.91	-2.13	+1.08	+0.90	1856 to 1862 }	+0.73	+2.01	-3.48	-2.13	+1.04	+0.60

TORONTO MAGNETICAL OBSERVATIONS.

TABLE XXXVII.

SOLAR DIURNAL VARIATION OF THE HORIZONTAL FORCE.

JANUARY.

FEBRUARY.

Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
	.000	.000	.00	.000	.000	.000		.000	.000	.00	.000	.000	.000
1854	+ 166	+ 299	-0002	+ 368	+ 071	- 033	1854	+ 699	+ 390	-0319	.000	- 164	- 144
1856	+ 501	+ 253	-0106	+ 429	- 232	- 069	1856	+ 511	+ 071	-0249	+ 331	- 061	- 026
1857	+ 402	+ 412	-0322	+ 187	+ 062	+ 128	1857	+ 539	+ 478	-0507	+ 051	- 159	+ 060
1858	+ 407	+ 520	-0568	+ 328	+ 094	+ 089	1858	+ 713	+ 798	-0857	- 298	+ 028	+ 080
1859	+ 472	+ 423	-0707	+ 143	+ 294	+ 245	1859	+ 573	+ 487	-0899	- 219	+ 173	+ 349
1860	+ 870	+ 426	-1008	+ 103	+ 187	+ 294	1860	+ 556	+ 352	-0942	- 059	+ 331	+ 227
1861	+ 310	+ 224	-0257	- 012	+ 324	+ 286	1861	+ 645	+ 347	-1205	- 078	+ 317	+ 440
1862	+ 590	+ 609	-0926	+ 060	+ 386	+ 156	1862	+ 342	+ 049	-0343	- 002	+ 211	+ 212
1856 to } 1862 }	.000 + 507	.000 + 410	.00 -0558	.000 + 177	.000 + 159	.000 + 161	1856 to } 1862 }	.000 + 554	.000 + 369	.00 -0715	.000 - 039	.000 + 120	.000 + 192

MARCH.

APRIL.

Toronto Astro- nomical Time.	18	20	2°	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
	.000	.000	.00	.000	.000	.000		.090	.000	.000	.000	.000	.000
1854	+ 283	+ 315	-0445	+ 170	+ 047	+ 241	1854	+ 205	- 058	+ 021	+ 634	- 082	+ 130
1856	+ 467	+ 148	-0227	+ 397	- 044	- 117	1856	+ 277	+ 148	- 167	+ 491	+ 151	+ 168
1857	+ 385	- 006	+0072	+ 504	- 229	- 115	1857	+ 204	- 301	+ 019	+ 569	+ 104	+ 256
1858	+ 682	+ 166	-1110	+ 028	+ 352	+ 495	1858	+ 383	- 171	- 747	+ 608	+ 369	+ 409
1859	+ 815	+ 228	-0920	+ 236	+ 173	+ 079	1859	+ 552	- 572	- 347	+ 793	+ 331	+ 097
1860	+ 939	- 122	-0893	+ 514	+ 223	- 052	1860	+ 505	- 318	- 152	+ 694	- 176	+ 298
1861	+ 291	- 428	-0641	+ 433	+ 466	+ 492	1861	+ 432	- 161	- 527	+ 476	+ 324	+ 257
1862	+ 424	- 077	-0679	+ 158	+ 298	+ 491	1862	+ 437	- 530	- 019	+ 656	+ 103	+ 203
1856 to } 1862 }	.000 + 572	.000 + 013	.00 -0628	.000 + 324	.000 + 177	.000 + 182	1856 to } 1862 }	.000 + 399	.000 - 272	.000 - 277	.000 + 612	.000 + 172	.000 + 241

MAY.

JUNE.

Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
	.000	.000	.000	.000	.000	.000		.000	.000	.000	.00	.000	.000
1854	+ 140	- 305	+ 585	+ 591	- 093	+ 087	1854	+ 259	- 464	+ 496	+0502	+ 088	+ 043
1856	+ 428	- 281	+ 227	+ 457	+ 082	+ 121	1856	+ 408	- 295	+ 273	+0315	+ 046	+ 208
1857	+ 308	- 322	+ 455	+ 408	+ 042	+ 134	1857	+ 368	- 373	+ 079	+0424	+ 209	+ 259
1858	+ 210	- 402	+ 250	+ 371	+ 196	+ 409	1858	+ 064	- 786	+ 084	+1026	+ 483	+ 107
1859	+ 455	- 714	+ 324	+ 528	+ 207	+ 231	1859	+ 404	- 658	+ 080	+0738	+ 339	+ 075
1860	+ 374	- 870	+ 124	+ 873	+ 167	+ 368	1860	+ 224	- 956	+ 633	+1128	- 032	- 026
1861	+ 188	- 215	+ 189	+ 523	+ 196	+ 149	1861	+ 391	- 247	- 108	+0683	+ 228	+ 038
1862	+ 243	- 342	+ 589	+ 916	- 285	- 080	1862	+ 219	- 231	+ 482	+0772	- 138	- 122
1856 to } 1862 }	.000 + 315	.000 - 449	.000 + 308	.000 + 582	.000 + 086	.000 + 190	1856 to } 1862 }	.000 + 297	.000 - 507	.000 + 218	.000 +0727	.000 + 162	.000 + 077

TABLE XXXVII.—(Continued.)

SOLAR DIURNAL VARIATION OF THE HORIZONTAL FORCE.

JULY.							AUGUST.						
Toronto Astronomical Time.	18	20	2	4	10	12	Toronto Astronomical Time.	18	20	2	4	10	12
	.000	.00	.000	.00	.000	.000		.000	.00	.000	.00	.000	.000
1853	— 231	—0272	+ 383	+0667	+ 130	+ 181	1853	+ 188	—0251	+ 272	+0577	+ 149	+ 090
1856	+ 355	—0333	+ 235	+0267	+ 152	+ 231	1855	+ 633	—1174	+ 050	+0545	+ 524	+ 442
1857	+ 335	—0649	+ 405	+0607	+ 137	+ 077	1856	+ 282	—0540	+ 435	+0410	+ 147	+ 255
1858	+ 056	—0563	+ 487	+0941	+ 121	+ 062	1857	+ 600	—0794	+ 174	+0147	+ 315	+ 279
1859	+ 137	—0776	+ 155	+1086	+ 095	+ 162	1858	+ 332	—0824	+ 275	+0730	+ 204	+ 304
1860	+ 006	—1159	+ 320	+1617	+ 068	000	1859	+ 364	—0759	+ 134	+0845	+ 293	+ 412
1861	+ 170	—0482	+ 411	+0941	+ 134	+ 056	1860	+ 204	—1296	+ 171	+1010	+ 277	+ 654
1862	+ 352	—0397	+ 179	+0880	+ 115	+ 086	1861	+ 241	—0504	+ 297	+0542	+ 313	+ 134
							1862	+ 458	—0626	+ 410	+0792	+ 131	+ 108
1856 to } 1862 }	.000 + 201	.00 —0623	.000 + 262	.00 +0906	.000 + 045	.000 + 080	1856 to } 1862 }	.000 + 355	.00 —0763	.000 +0233	.00 +0682	.000 + 203	.000 + 307
SEPTEMBER.							OCTOBER.						
Toronto Astronomical Time.	18	20	2	4	10	12	Toronto Astronomical Time.	18	20	2	4	10	12
	.000	.00	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
1053	+ 200	—0623	+ 172	+ 771	+ 271	+ 382	1853	+ 532	+ 056	— 370	+ 242	+ 194	+ 004
1855	+ 420	—0507	+ 194	+ 333	+ 198	+ 274	1855	+ 412	— 184	+ 045	+ 162	+ 031	+ 194
1856	+ 483	—0398	+ 128	+ 399	+ 243	+ 316	1856	+ 528	— 164	+ 212	+ 219	+ 112	+ 178
1857	+ 549	—0980	+ 270	+ 512	+ 516	+ 299	1857	+ 678	— 155	+ 350	+ 108	+ 114	+ 261
1858	+ 378	—0831	+ 235	+ 522	+ 648	+ 687	1858	+ 632	— 387	+ 238	+ 398	+ 268	+ 512
1859	+ 780	—1049	+ 430	+ 711	+ 689	+ 471	1859	+ 795	+ 217	+ 691	+ 038	+ 163	+ 216
1860	+ 234	—1026	+ 026	+ 655	+ 617	+ 664	1860	+ 573	— 408	+ 701	+ 292	+ 402	+ 501
1861	+ 507	—0647	+ 097	+ 464	+ 459	+ 485	1861	+ 531	— 380	+ 369	+ 200	+ 333	+ 345
1862	+ 760	—0628	+ 351	+ 572	+ 613	+ 206	1862	+ 682	— 642	+ 451	+ 446	+ 186	+ 433
1856 to } 1862 }	.000 + 527	.000 — 794	.00 —0098	.000 + 548	.000 + 541	.000 + 447	1856 to } 1862 }	.000 + 631	.000 — 274	.000 — 431	.000 + 232	.000 + 225	.000 + 203
NOVEMBER.							DECEMBER.						
Toronto Astronomical Time.	18	20	2	4	10	12	Toronto Astronomical Time.	18	20	2	4	10	12
	.000	.000	.000	.000	.000	.000		.000	.000	.00	.000	.000	.000
1853	+ 546	+ 325	— 278	+ 165	— 015	— 019	1853	+ 412	+ 377	—0382	+ 118	+ 084	+ 025
1855	+ 479	— 016	— 051	+ 220	+ 159	— 068	1855	+ 298	+ 279	+0021	+ 199	+ 115	+ 094
1856	+ 336	+ 200	— 054	+ 340	— 068	— 042	1856	+ 394	+ 209	—0127	+ 207	— 002	+ 084
1857	+ 683	+ 165	— 311	+ 138	+ 117	+ 203	1857	+ 318	+ 405	—0356	+ 105	+ 053	+ 064
1858	+ 763	— 031	— 538	+ 226	+ 162	+ 137	1858	+ 523	+ 520	—0642	+ 012	+ 008	+ 171
1859	+ 683	— 103	— 905	+ 117	+ 419	+ 509	1859	+ 846	+ 212	—1089	+ 485	+ 109	+ 028
1860	+ 528	— 146	+ 435	+ 104	+ 415	+ 248	1860	+ 462	+ 015	—0479	+ 068	+ 36	+ 294
1861	+ 631	+ 051	— 459	— 061	+ 318	+ 233	1861	+ 639	+ 369	—0713	+ 109	+ 245	+ 120
1862	+ 538	+ 246	— 381	— 081	+ 214	+ 175	1862	+ 134	+ 220	—0517	+ 086	+ 169	+ 037
1856 to } 1862 }	.000 + 595	.000 + 055	.000 — 316	.000 + 072	.000 + 225	.000 + 209	1856 to } 1862 }	.000 + 474	.000 + 279	.00 —0560	.000 +097	.000 + 136	.000 + 090

TABLE XXXVIII.
SOLAR DIURNAL VARIATION OF VERTICAL FORCE.

JANUARY.							FEBRUARY.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	.000	.000	.000	.000	.000	.000	1854	.000	.000	.000	.000	.000	.000
1856	— 279	+ 004	+ 098	+ 090	+ 087	+ 056	1856	— 272	— 007	+ 101	+ 146	+ 114	+ 037
1857	— 060	— 061	+ 065	+ 119	+ 015	— 024	1857	— 150	+ 120	+ 041	+ 110	+ 063	— 055
1858	— 131	+ 048	+ 057	+ 038	+ 052	— 011	1858	— 069	— 021	+ 017	+ 121	+ 060	+ 022
1859	— 036	— 003	+ 055	+ 080	+ 003	— 005	1859	— 110	— 054	+ 007	+ 190	+ 102	— 005
1860	— 070	— 044	+ 019	+ 123	+ 016	+ 011	1860	— 031	— 022	— 026	+ 120	+ 057	+ 032
1861	— 100	— 030	+ 045	+ 088	+ 054	— 001	1861	— 077	— 005	+ 032	+ 119	+ 041	+ 020
1862	— 102	— 114	+ 117	+ 039	+ 089	+ 026	1862	— 067	— 101	+ 071	+ 181	+ 026	+ 017
1856 to } 1862 }	.000	.000	.000	.000	.000	.000	1856 to } 1862 }	.000	.000	.000	.000	.000	.000
	— 091	— 032	+ 067	+ 089	+ 029	— 002		— 094	— 029	+ 031	+ 139	+ 066	+ 015
MARCH.							APRIL.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	.000	.000	.000	.000	.000	.000	1854	.000	.000	.000	.000	.000	.000
1856	— 077	— 021	+ 060	+ 083	+ 211	— 149	1856	— 180	+ 017	+ 111	+ 199	+ 270	— 242
1857	— 110	— 067	+ 008	+ 084	+ 114	+ 077	1857	— 030	— 038	+ 017	+ 132	+ 072	+ 025
1858	+ 040	— 024	+ 046	+ 149	— 009	— 096	1858	+ 028	— 019	+ 023	+ 090	+ 046	+ 006
1859	— 111	— 156	+ 242	+ 075	+ 070	— 012	1859	+ 035	+ 062	— 051	+ 099	+ 014	+ 019
1860	— 093	— 017	+ 059	+ 267	— 024	— 085	1860	+ 055	— 113	+ 093	+ 163	+ 017	— 039
1861	— 167	— 110	+ 040	+ 283	+ 110	— 014	1861	— 137	— 100	+ 104	+ 290	+ 085	— 066
1862	— 144	— 069	+ 197	+ 143	— 026	+ 007	1862	— 036	— 032	+ 055	+ 133	+ 052	+ 005
1856 to } 1862 }	.000	.000	.000	.000	.000	.000	1856 to } 1862 }	.000	.000	.000	.000	.000	.000
	— 098	— 071	+ 089	+ 161	+ 044	— 013		— 027	— 034	+ 043	+ 154	+ 055	— 013
MAY.							JUNE.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	.000	.000	.000	.000	.000	.000	1854	.000	.000	.000	.000	.000	.000
1856	— 185	— 286	+ 221	+ 251	+ 115	+ 004	1856	— 073	— 057	+ 026	+ 172	— 005	— 022
1857	+ 009	— 052	+ 036	+ 098	+ 044	— 012	1857	+ 034	— 055	— 030	+ 116	+ 010	— 036
1858	+ 001	+ 048	— 011	+ 075	+ 011	— 003	1858	+ 050	+ 011	— 057	+ 011	+ 026	000
1859	— 008	— 048	+ 057	+ 147	+ 059	— 087	1859	— 134	— 071	+ 014	+ 217	+ 123	— 110
1860	+ 015	— 028	+ 007	+ 132	+ 044	— 047	1860	— 009	— 081	— 012	+ 096	+ 061	— 018
1861	— 024	— 102	+ 025	+ 161	+ 088	— 028	1861	+ 021	— 098	— 040	+ 046	+ 029	+ 083
1862	— 045	— 059	+ 040	+ 149	+ 072	— 034	1862	— 048	— 114	+ 004	+ 156	+ 052	— 011
1856 to } 1862 }	.000	.000	.000	.000	.000	.000	1856 to } 1862 }	.000	.000	.000	.000	.000	.000
	— 017	— 044	+ 029	+ 140	+ 052	— 039		— 019	— 061	— 015	+ 115	+ 051	— 031

TABLE XXXVIII.
SOLAR DIURNAL VARIATION OF VERTICAL FORCE.

JULY.							AUGUST.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	.000	.000	.000	.000	.000	.000	1853	.000	.000	.009	.000	.000	.000
1856	— 087	— 065	+ 165	+ 216	+ 109	— 234	1855	— 068	— 065	— 001	+ 190	+ 121	— 058
1857	+ 067	— 034	— 056	+ 062	+ 072	— 010	1856	+ 029	+ 046	+ 071	+ 063	+ 009	— 096
1858	+ 081	— 036	— 024	+ 118	+ 007	— 045	1857	+ 063	— 065	+ 081	+ 129	— 019	— 067
1859	+ 003	— 057	— 033	+ 135	+ 052	+ 001	1858	+ 044	+ 003	— 002	+ 107	+ 018	— 049
1860	— 045	— 096	— 003	+ 123	+ 113	+ 012	1859	+ 075	+ 007	— 012	+ 119	— 011	— 059
1861	— 061	— 111	+ 116	+ 133	+ 039	— 013	1860	+ 011	— 081	+ 011	+ 116	+ 048	+ 016
1862	— 005	— 121	+ 044	+ 202	+ 014	— 033	1861	+ 048	— 088	+ 064	+ 155	+ 054	— 110
...	— 098	— 120	+ 015	+ 211	+ 086	+ 010	1862	+ 057	— 011	+ 031	+ 191	— 032	— 116
1856 to } 1862 }	.000	.000	.000	.000	.000	.000	1856 to } 1862 }	.000	.000	.000	.000	.000	.000
	— 008	— 082	+ 008	+ 141	+ 055	— 011		+ 031	— 044	+ 040	+ 147	+ 004	— 057
SEPTEMBER.							OCTOBER.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	.000	.000	.000	.000	.000	.000	1853	.000	.000	.000	.000	.000	.000
1855	— 095	— 123	+ 160	+ 199	+ 076	— 102	1855	— 219	+ 172	+ 052	+ 132	+ 057	— 109
1856	— 011	+ 022	+ 061	+ 112	— 032	— 037	1856	— 076	+ 008	+ 079	+ 083	+ 015	— 031
1857	+ 042	— 073	+ 090	+ 119	+ 040	— 100	1857	+ 016	— 007	+ 022	+ 075	— 033	+ 005
1858	+ 057	— 075	+ 095	+ 190	+ 004	— 152	1858	+ 042	+ 042	+ 054	+ 080	— 026	— 113
1859	+ 015	— 022	+ 052	+ 091	+ 022	— 054	1859	— 050	— 047	+ 075	+ 096	+ 064	— 059
1860	— 068	— 118	+ 079	+ 186	+ 046	— 009	1860	— 306	— 117	+ 062	+ 159	+ 173	+ 106
1861	+ 107	— 035	+ 059	+ 090	+ 006	— 112	1861	+ 015	+ 033	— 057	+ 112	+ 033	— 055
1862	— 023	— 013	+ 051	+ 094	+ 030	— 023	1862	— 001	+ 008	+ 040	+ 056	+ 024	— 048
1856 to } 1862 }	.000	.000	.000	.000	.000	.000	1856 to } 1862 }	.000	.000	.000	.000	.000	.000
	+ 005	— 062	+ 085	+ 141	+ 029	— 082		— 086	— 017	+ 048	+ 110	+ 055	— 032
NOVEMBER.							DECEMBER.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	.000	.000	.000	.000	.000	.000	1853	.000	.000	.000	.000	.000	.000
1855	+ 168	+ 021	+ 024	+ 138	— 071	— 030	1855	— 220	— 150	+ 094	+ 204	+ 104	+ 044
1856	— 075	— 042	+ 051	+ 069	+ 070	+ 001	1856	+ 015	— 027	+ 036	+ 059	+ 007	— 015
1857	— 068	— 075	+ 058	+ 092	+ 064	+ 003	1857	— 071	+ 015	+ 031	+ 100	+ 024	— 023
1858	— 044	+ 041	+ 087	+ 119	— 026	— 102	1858	— 082	— 047	+ 095	+ 141	+ 016	— 048
1859	— 008	— 075	+ 060	+ 101	+ 043	— 048	1859	— 114	— 049	+ 094	+ 101	+ 051	— 009
1860	— 039	+ 002	+ 069	+ 118	+ 022	— 100	1860	— 113	— 157	+ 126	+ 182	+ 024	+ 014
1861	— 081	+ 019	+ 059	+ 081	+ 042	— 046	1861	— 114	— 068	+ 129	+ 102	+ 030	— 003
1862	— 133	— 054	+ 119	+ 109	+ 040	— 005	1862	— 174	— 157	+ 078	+ 110	+ 205	+ 015
1856 to } 1862 }	.000	.000	.000	.000	.000	.000	1856 to } 1862 }	.000	.000	.000	.000	.000	.000
	— 071	— 035	+ 083	+ 107	+ 036	— 047		— 113	— 074	+ 094	+ 117	+ 059	+ 003

TABLE XXXIX.

SOLAR DIURNAL VARIATION OF TOTAL FORCE.

JANUARY.							FEBRUARY.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	.000	.000	.000	.000	.000	.000	1854	.000	.000	.000	.000	.000	.000
1856	— 251	+ 023	+ 092	+ 108	+ 086	+ 050	1855	— 210	+ 018	+ 074	+ 137	+ 096	+ 025
1857	— 024	— 041	+ 054	+ 139	— 001	— 027	1856	— 108	+ 117	+ 022	+ 124	+ 055	— 053
1858	— 097	+ 071	+ 033	+ 047	+ 053	— 002	1857	— 030	+ 011	— 016	+ 117	+ 046	+ 024
1859	— 008	+ 030	+ 015	+ 096	+ 009	+ 001	1858	— 058	.000	— 048	+ 159	+ 097	.000
1860	— 035	— 014	— 027	+ 124	+ 034	+ 026	1859	+ 007	+ 010	— 082	+ 058	+ 064	+ 052
1861	— 038	— 001	— 022	+ 059	+ 062	+ 018	1860	— 037	+ 018	— 030	+ 108	+ 060	+ 013
1862	— 076	— 092	+ 093	+ 036	+ 104	+ 043	1861	— 022	— 072	— 010	+ 164	+ 045	+ 044
1862	— 093	+ 018	+ 046	+ 132	+ 002	.000	1862	— 123	— 109	+ 051	+ 126	+ 119	+ 084
1856 to 1862 }	.000	.000	.000	.000	.000	.000	1856 to 1862 }	.000	.000	.000	.000	.000	.000
	— 053	— 001	+ 027	+ 095	+ 038	+ 008		— 053	— 001	— 016	+ 128	+ 069	+ 026
MARCH.							APRIL.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	.000	.000	.000	.000	.000	.000	1854	.000	.000	.000	.000	.000	.000
1856	— 054	.000	+ 028	+ 089	+ 200	— 124	1855	— 155	+ 012	+ 105	+ 227	+ 247	— 218
1857	— 073	— 053	— 007	+ 104	+ 104	+ 065	1856	— 011	— 026	+ 005	+ 155	+ 077	+ 034
1858	+ 062	— 023	+ 048	+ 172	— 023	— 097	1857	+ 039	— 037	+ 023	+ 121	+ 050	+ 022
1859	— 061	— 135	+ 156	+ 072	+ 088	+ 020	1858	+ 057	+ 047	— 095	+ 131	+ 037	+ 044
1860	— 035	— 001	— 003	+ 265	— 012	— 075	1859	+ 087	— 142	+ 065	+ 203	+ 037	— 030
1861	— 097	— 111	— 020	+ 298	+ 117	— 016	1860	— 096	— 114	+ 088	+ 316	+ 068	— 043
1862	— 116	— 092	+ 144	+ 161	+ 005	+ 038	1861	— 006	— 040	+ 018	+ 155	+ 069	+ 021
1862	— 070	— 056	— 012	+ 127	+ 086	+ 064	1862	— 071	— 034	+ 054	+ 199	+ 098	— 026
1856 to 1862 }	.000	.000	.000	.000	.000	.000	1856 to 1862 }	.000	.000	.000	.000	.000	.000
	— 066	— 067	+ 044	+ 171	+ 052	.000		.000	— 049	+ 023	+ 183	+ 062	+ 003
MAY.							JUNE.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	.000	.000	.000	.000	.000	.000	1854	.000	.000	.000	.000	.000	.000
1856	— 164	— 287	+ 247	+ 273	+ 102	+ 009	1855	— 052	— 083	+ 056	+ 193	+ 001	— 018
1857	+ 036	— 067	+ 048	+ 121	+ 046	— 004	1856	+ 058	— 070	— 011	+ 129	+ 012	— 021
1858	+ 021	+ 024	+ 019	+ 096	+ 013	+ 006	1857	+ 070	— 013	— 048	+ 037	+ 038	+ 017
1859	+ 006	— 071	+ 069	+ 161	+ 068	— 055	1858	— 121	— 117	+ 018	+ 269	+ 146	— 096
1860	+ 043	— 072	+ 027	+ 157	+ 054	— 029	1859	+ 017	— 118	— 006	+ 137	+ 079	— 012
1861	+ 001	— 151	+ 031	+ 206	+ 093	— 003	1860	+ 034	— 153	+ 003	+ 115	+ 025	+ 076
1862	— 030	— 069	+ 049	+ 173	+ 050	— 022	1861	— 020	— 122	— 003	+ 190	+ 063	— 008
1862	— 045	— 087	+ 084	+ 265	+ 028	— 065	1862	— 027	— 034	+ 048	+ 199	+ 043	— 128
1856 to 1862 }	.000	.000	.000	.000	.000	.000	1856 to 1862 }	.000	.000	.000	.000	.000	.000
	+ 003	— 070	+ 047	+ 163	+ 055	— 025		+ 001	— 090	.000	+ 154	+ 058	— 025

TABLE XXXIX.—Continued.
SOLAR DIURNAL VARIATION OF TOTAL FORCE.

JULY.							AUGUST.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	.000	.000	.000	.000	.000	.000	1853	.000	.000	.000	.000	.000	.000
1855	— 096	— 078	+ 179	+ 245	+ 110	— 207	1855	+ 067	— 032	+ 070	+ 094	+ 042	— 062
1856	+ 085	— 053	— 037	+ 075	+ 077	+ 005	1856	+ 077	— 095	+ 104	+ 147	— 008	— 046
1857	+ 097	— 075	+ 003	+ 149	+ 015	— 037	1857	+ 079	— 048	+ 009	+ 129	+ 037	— 028
1858	+ 006	— 089	.000	+ 186	+ 041	+ 005	1858	+ 091	— 046	+ 006	+ 158	+ 003	— 036
1859	— 033	— 139	+ 007	+ 184	+ 112	+ 022	1859	+ 033	— 124	+ 002	+ 162	+ 064	+ 041
1860	— 057	— 178	+ 129	+ 228	+ 041	— 012	1860	+ 058	— 165	+ 071	+ 209	+ 068	— 061
1861	+ 006	— 144	+ 067	+ 249	+ 005	— 034	1861	+ 069	— 042	+ 048	+ 213	— 010	— 100
1862	— 069	— 138	+ 003	+ 254	+ 088	+ 015	1862	— 043	— 111	+ 129	+ 250	— 035	— 009
1856 to } 1862 }	.000	.000	.000	.000	.000	.000	1856 to } 1862 }	.000	.000	.000	.000	.000	.000
	+ 005	— 117	+ 027	+ 189	+ 054	— 005		+ 052	— 090	+ 053	+ 181	+ 017	— 034
SEPTEMBER.							OCTOBER.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	.000	.000	.000	.000	.000	.000	1853	.000	.000	.000	.000	.000	.000
1855	— 076	— 155	+ 161	+ 235	+ 088	— 071	1855	— 171	+ 165	+ 025	+ 139	+ 066	— 102
1856	+ 017	— 012	+ 069	+ 126	— 017	— 017	1856	— 045	— 004	+ 077	+ 088	+ 016	— 017
1857	+ 070	— 094	+ 092	+ 137	+ 053	— 073	1857	+ 049	— 017	+ 007	+ 084	— 024	+ 016
1858	+ 068	— 133	+ 106	+ 210	+ 037	— 123	1858	+ 083	+ 029	+ 028	+ 082	— 017	— 089
1859	+ 038	— 074	+ 034	+ 118	+ 062	— 007	1859	— 007	— 069	+ 055	+ 115	+ 077	— 088
1860	— 014	— 177	+ 047	+ 219	+ 087	+ 022	1860	— 236	— 096	+ 014	+ 146	+ 172	+ 113
1861	+ 115	— 098	+ 057	+ 126	+ 045	— 063	1861	+ 051	+ 005	— 098	+ 123	+ 056	— 020
1862	+ 011	— 053	+ 042	+ 118	+ 057	+ 009	1862	+ 033	— 017	+ 014	+ 065	+ 044	— 023
1856 to } 1862 }	.000	.000	.000	.000	.000	.000	1856 to } 1862 }	.000	.000	.000	.000	.000	.000
	+ 038	— 109	+ 073	+ 166	+ 061	— 048		— 040	— 033	+ 018	+ 118	+ 066	— 017
NOVEMBER.							DECEMBER.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	.000	.000	.000	.000	.000	.000	1853	.000	.000	.000	.000	.000	.000
1855	+ 192	+ 040	+ 005	+ 140	— 068	— 029	1855	— 180	— 116	+ 064	+ 198	+ 103	+ 040
1856	— 040	— 010	+ 044	+ 079	+ 076	— 003	1856	+ 033	— 008	+ 035	+ 068	— 001	— 020
1857	— 042	— 058	+ 051	+ 108	+ 056	.000	1857	— 041	+ 027	+ 021	+ 107	+ 022	— 027
1858	+ 002	+ 049	+ 062	+ 103	+ 017	— 083	1858	— 056	— 018	+ 066	+ 139	+ 018	— 041
1859	+ 041	— 072	+ 022	+ 109	+ 051	— 036	1859	— 073	— 013	+ 047	+ 095	+ 048	+ 008
1860	+ 007	— 005	+ 007	+ 118	+ 047	— 061	1860	— 052	— 134	+ 049	+ 291	+ 029	+ 016
1861	— 042	+ 009	+ 027	+ 082	+ 066	— 027	1861	— 077	— 063	+ 090	+ 100	+ 052	+ 016
1862	— 084	— 047	+ 082	+ 098	+ 058	+ 010	1862	— 122	— 124	+ 028	+ 096	+ 207	+ 032
1856 to } 1862 }	.000	.000	.000	.000	.000	.000	1856 to } 1862 }	.000	.000	.000	.000	.000	.000
	— 028	— 029	+ 049	+ 105	+ 033	— 030		— 075	— 052	+ 052	+ 115	+ 064	+ 008

TORONTO MAGNETICAL OBSERVATIONS.

TABLE XL.
SOLAR DIURNAL VARIATION OF INCLINATION.

JANUARY.							FEBRUARY.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	— 22	— 15	+ 5	— 14	+ 1	+ 4	1854	— 49	— 20	+ 21	+ 7	+ 14	+ 9
1856	— 28	— 16	+ 9	— 16	+ 12	+ 2	1856	— 33	+ 8	+ 15	— 11	+ 6	— 2
1857	— 27	— 18	+ 19	— 7	— 1	— 7	1857	— 31	— 25	+ 25	+ 4	+ 11	— 2
1858	— 22	— 26	+ 31	— 13	— 5	— 5	1858	— 41	— 43	+ 44	+ 25	+ 4	— 4
1859	— 27	— 24	+ 37	— 1	— 14	— 12	1859	— 30	— 26	+ 44	+ 17	— 6	— 16
1860	— 49	— 23	+ 53	— 1	— 7	— 15	1860	— 32	— 18	+ 49	+ 9	— 15	— 10
1861	— 21	— 17	+ 19	+ 3	— 12	— 13	1861	— 36	— 23	+ 64	+ 13	— 15	— 21
1862	— 37	— 32	+ 53	+ 4	— 21	— 8	1862	— 25	— 9	+ 21	+ 7	— 5	— 7
1856 to } 1862 }	—30.2	—22.2	+31.5	— 4.4	— 6.6	— 8.2	1856 to } 1862 }	—32.7	—20.0	+37.6	+ 9.0	— 2.7	— 8.9

MARCH.							APRIL.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	— 18	— 17	+ 25	— 4	+ 8	— 20	1854	— 19	+ 4	+ 5	— 22	+ 18	— 19
1856	— 29	— 11	+ 12	— 16	+ 8	+ 10	1856	— 16	— 9	+ 9	— 18	— 4	— 7
1857	— 17	— 1	— 1	— 18	+ 11	+ 1	1857	— 9	+ 14	0	— 24	— 3	— 13
1858	— 40	— 16	+ 68	+ 2	— 14	— 25	1858	— 17	+ 12	+ 35	— 26	— 18	— 20
1859	— 46	— 12	+ 49	+ 2	— 10	— 8	1859	— 25	+ 23	+ 22	— 32	— 16	— 7
1860	— 56	+ 1	+ 47	— 12	— 6	— 2	1860	— 32	+ 11	+ 13	— 20	+ 13	— 18
1861	— 22	+ 18	+ 42	— 15	— 25	— 24	1861	— 24	+ 7	+ 29	— 17	— 14	— 13
1862	— 27	+ 1	+ 36	— 2	— 11	— 23	1862	— 27	+ 27	+ 4	— 25	0	— 12
1856 to } 1862 }	—33.8	— 2.9	+36.1	— 8.2	— 6.7	—10.3	1856 to } 1862 }	—21.4	+12.0	+16.1	—23.1	— 5.9	—12.8

MAY.							JUNE.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1854	— 16	+ 1	— 18	— 17	+ 11	— 4	1854	— 17	+ 21	— 24	— 17	— 5	— 3
1856	— 21	+ 11	— 10	— 18	— 2	— 7	1856	— 19	+ 12	— 15	— 10	— 2	— 12
1857	— 16	+ 19	— 24	— 17	— 2	— 7	1857	— 16	+ 19	— 7	— 21	— 9	— 13
1858	— 11	+ 18	— 10	— 11	— 7	— 25	1858	— 10	+ 36	— 4	— 41	— 18	— 11
1859	— 22	+ 35	— 16	— 20	— 8	— 14	1859	— 21	+ 29	— 5	— 32	— 14	— 5
1860	— 20	+ 39	— 5	— 36	— 4	— 20	1860	— 10	+ 43	— 34	— 54	+ 3	+ 5
1861	— 12	+ 8	— 8	— 19	— 6	— 9	1861	— 22	+ 7	+ 6	— 27	— 9	— 3
1862	— 15	+ 14	— 27	— 35	+ 17	+ 1	1862	— 13	+ 11	— 23	— 31	+ 10	0
1856 to } 1862 }	—16.7	+20.4	—14.1	—22.3	— 1.7	—11.6	1856 to } 1862 }	—15.9	+22.4	—11.7	—30.8	— 5.6	— 5.5

TABLE XL.—(Continued.)
SOLAR DIURNAL VARIATION OF INCLINATION.

JULY.							AUGUST.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	+ 7	+ 10	— 11	— 23	— 1	— 21	1853	— 13	+ 9	— 14	— 20	— 1	— 8
1855	— 15	+ 15	— 15	— 10	— 4	— 12	1855	— 30	+ 62	+ 1	— 24	— 26	— 27
1856	— 13	+ 31	— 22	— 25	— 7	— 6	1856	— 11	+ 24	— 18	— 14	— 8	— 16
1857	— 3	+ 25	— 26	— 41	+ 9	— 3	1857	— 28	+ 40	— 9	— 17	— 15	— 17
1858	— 9	+ 34	— 8	— 48	+ 1	— 8	1858	— 13	+ 42	— 14	— 31	— 11	— 18
1859	— 3	+ 53	— 10	— 75	— 1	— 1	1859	— 18	+ 34	+ 7	— 37	— 12	— 20
1860	— 9	+ 18	— 19	— 37	+ 8	+ 1	1860	— 8	+ 61	— 5	— 43	— 11	— 38
1861	— 23	+ 14	+ 10	— 34	— 2	— 4	1861	— 9	+ 25	— 13	— 18	— 17	— 13
1862							1862	— 27	+ 28	— 15	— 29	— 5	— 6
1856 to } 1862 }	—10.6	+27.3	—12.8	—38.5	+ 0.5	— 4.6	1856 to } 1862 }	—16.3	+36.2	— 9.7	—27.0	—10.0	—18.3

SEPTEMBER.							OCTOBER.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1053	— 15	+ 25	— 1	— 29	— 10	— 24	1853	— 38	+ 6	+ 21	— 6	— 7	— 6
1855	— 22	+ 27	— 7	— 11	— 12	— 16	1855	— 25	+ 10	+ 2	— 4	— 1	— 11
1856	— 22	+ 16	— 2	— 14	— 10	— 21	1856	— 26	+ 8	+ 12	— 7	— 7	— 9
1857	— 25	+ 46	— 9	— 16	— 26	— 23	1857	— 32	+ 10	+ 20	— 1	— 7	— 19
1858	— 18	+ 41	+ 15	— 22	— 31	— 37	1858	— 34	+ 17	+ 16	— 15	— 10	+ 23
1859	— 43	+ 47	+ 26	— 26	— 32	— 24	1859	— 56	— 17	+ 38	+ 10	+ 1	— 5
1860	— 6	+ 50	+ 2	— 29	— 31	— 39	1860	— 28	+ 22	+ 33	— 9	— 19	— 28
1861	— 27	+ 32	+ 7	— 19	— 22	— 26	1861	— 27	+ 19	+ 21	— 7	— 16	— 20
1862	— 43	+ 27	+ 26	— 18	— 28	— 17	1862	— 50	+ 31	+ 30	— 13	— 2	— 25
1856 to } 1862 }	—26.3	+36.9	+ 9.2	—20.5	—25.8	—26.6	1856 to } 1862 }	—36.1	+12.9	+24.1	— 6.2	— 8.6	—11.8

NOVEMBER.							DECEMBER.						
Toronto Astro- nomical Time.	18	20	2	4	10	12	Toronto Astro- nomical Time.	18	20	2	4	10	12
1853	— 19	— 15	+ 15	— 1	— 3	— 1	1853	— 32	— 27	+ 24	+ 4	+ 1	+ 4
1855	— 28	— 1	+ 5	— 8	— 5	+ 3	1855	— 14	— 15	+ 1	— 7	+ 6	+ 4
1856	— 20	— 14	+ 6	— 12	+ 7	+ 2	1856	— 23	— 10	+ 8	— 5	+ 1	+ 3
1857	— 37	— 6	+ 20	+ 13	— 7	— 15	1857	— 20	— 23	+ 23	+ 2	— 2	— 6
1858	— 39	— 2	+ 30	— 6	— 6	— 9	1858	— 32	— 29	+ 37	+ 5	+ 2	— 9
1859	— 36	+ 5	+ 49	0	— 20	— 31	1859	— 48	— 19	+ 61	— 15	— 4	— 1
1860	— 31	+ 8	+ 25	— 1	— 19	— 15	1860	— 29	— 5	+ 31	+ 2	— 17	— 15
1861	— 39	— 5	+ 29	+ 9	— 14	— 12	1861	— 41	— 26	+ 40	+ 11	— 2	— 5
1862	— 33	— 18	+ 26	+ 11	— 17	— 10	1862	— 13	— 14	+ 31	+ 8	— 5	+ 2
1856 to } 1862 }	—33.5	— 4.5	+26.3	+ 1.8	— 9.6	—12.9	1856 to } 1862 }	—29.5	—17.8	+32.9	+ 1.0	— 3.9	— 4.4

TABLE XLI.

ANNUAL AND SEMI-ANNUAL MEANS AND SEMI-ANNUAL INEQUALITY OF THE SOLAR DIURNAL
VARIATION OF DECLINATION—YEAR ENDING 31st DECEMBER.

Toronto Astro- nomical Time.	WINTER.						SUMMER.					
	18	20	2	4	10	12	18	20	2	4	10	12
1856	+ 1.12	+ 2.54	- 3.12	- 1.22	+ 0.71	+ 0.27	+ 4.45	+ 5.39	- 5.48	- 2.76	+ 0.85	+ 0.58
1857	+ 1.14	+ 2.74	- 3.59	- 1.63	+ 1.00	+ 0.64	+ 5.17	+ 5.76	- 5.87	- 3.05	0.00	+ 0.50
1858	+ 1.65	+ 3.58	- 4.28	- 2.72	+ 1.33	+ 0.71	+ 4.91	+ 6.84	- 6.80	- 3.49	+ 0.27	+ 0.80
1859	+ 1.69	+ 4.31	- 4.78	- 3.34	+ 1.13	+ 1.27	+ 5.79	+ 8.10	- 7.49	- 3.76	- 0.80	+ 0.19
1860	+ 1.89	+ 4.16	- 4.69	- 3.03	+ 0.86	+ 0.96	+ 5.94	+ 7.68	- 7.17	- 3.72	+ 0.14	+ 0.64
1861	+ 1.89	+ 3.78	- 4.54	- 2.76	+ 1.09	+ 0.83	+ 5.16	+ 7.23	- 6.83	- 3.81	+ 0.03	+ 0.74
1862	+ 1.39	+ 3.84	- 4.36	- 2.42	+ 0.63	+ 0.58	+ 5.15	+ 6.67	- 6.74	- 3.23	+ 0.01	+ 0.65
1856 to 1862 }	+ 1.54	+ 3.56	- 4.19	- 2.45	+ 0.96	+ 0.75	+ 5.22	+ 6.74	- 6.55	- 3.40	+ 0.07	+ 0.58

Toronto Astro- nomical Time.	YEAR.						SEMIANNUAL INEQUALITY—The signs are those proper to the half year from April to September inclusive.					
	18	20	2	4	10	12	18	20	2	4	10	12
1856	+ 2.79	+ 3.97	- 4.30	- 1.99	+ 0.53	+ 0.42	+ 1.66	+ 1.42	- 1.18	- 0.77	- 0.18	+ 0.14
1857	+ 3.16	+ 4.25	- 4.74	- 2.34	+ 0.50	+ 0.57	+ 2.01	+ 1.51	- 1.13	- 0.71	- 0.50	- 0.07
1858	+ 3.28	+ 4.96	- 5.29	- 3.11	+ 0.81	+ 0.76	+ 1.63	+ 1.38	- 1.01	- 0.38	- 0.54	+ 0.04
1859	+ 3.74	+ 6.21	- 6.13	- 3.55	+ 0.42	+ 0.73	+ 2.05	+ 1.89	- 1.36	- 0.21	- 0.72	- 0.54
1860	+ 3.92	+ 5.92	- 5.93	- 3.38	+ 0.50	+ 0.80	+ 2.02	+ 1.76	- 1.24	- 0.34	- 0.36	- 0.16
1861	+ 3.53	+ 5.51	- 5.69	- 3.29	+ 0.56	+ 0.78	+ 1.63	+ 1.72	- 1.14	- 0.52	- 0.53	- 0.04
1862	+ 3.27	+ 5.26	- 5.55	- 2.83	+ 0.32	+ 0.62	+ 1.88	+ 1.41	- 1.19	- 0.40	- 0.31	+ 0.03
1856 to 1862 }	+ 3.38	+ 5.15	- 5.38	- 2.93	+ 0.52	+ 0.67	+ 1.84	+ 1.59	- 1.17	- 0.47	- 0.45	- 0.09

TABLE XLII.

ANNUAL AND SEMI-ANNUAL MEANS AND SEMI-ANNUAL INEQUALITY OF THE SOLAR DIURNAL VARIATION OF HORIZONTAL FORCE—YEAR ENDING 31st DECEMBER.

Toronto Astro- nomical Time.	WINTER.						SUMMER.					
	18	20	2	4	10	12	18	20	2	4	10	12
1856	.000 + 456	.000 + 119	.000 — 163	.000 + 320	.000 — 049	.000 — 027	.000 + 372	.000 — 283	.000 + 188	.000 + 390	.000 + 137	.000 + 217
1857	+ 501	+ 216	— 296	+ 101	— 007	+ 100	+ 394	— 243	+ 234	+ 494	+ 221	+ 217
1858	+ 620	+ 264	— 659	+ 116	+ 152	+ 077	+ 237	— 596	+ 019	+ 700	+ 296	+ 330
1859	+ 697	+ 244	— 869	+ 082	+ 222	+ 238	+ 449	— 755	— 059	+ 784	+ 326	+ 241
1860	+ 655	+ 020	— 598	+ 170	+ 321	+ 252	+ 258	— 937	+ 187	+ 996	+ 154	+ 326
1861	+ 508	+ 031	— 607	+ 062	+ 334	+ 319	+ 322	— 376	+ 028	+ 605	+ 231	+ 168
1862	+ 452	+ 067	— 551	+ 083	+ 244	+ 251	+ 412	— 459	+ 155	+ 765	+ 046	+ 067
1856 to } 1862 }	+ 556	+ 137	— 535	+ 133	+ 174	+ 173	+ 349	— 521	+ 107	+ 676	+ 201	+ 224

Toronto Astro- nomical Time.	YEAR.						SEMI-ANNUAL INEQUALITY.—The signs are those proper to the half-year from April to September inclusive.					
	18	20	2	4	10	12	18	20	2	4	10	12
1856	.000 + 414	.000 — 082	.000 + 013	.000 + 355	.000 + 044	.000 + 095	.000 — 042	.000 — 201	.000 + 175	.000 + 035	.000 + 093	.000 + 122
1857	+ 447	— 013	— 031	+ 298	+ 107	+ 159	— 053	— 230	+ 265	+ 196	+ 114	+ 058
1858	+ 429	— 166	— 320	+ 408	+ 224	+ 203	— 192	— 430	+ 339	+ 292	+ 072	+ 127
1859	+ 573	— 255	— 464	+ 433	+ 274	+ 240	— 124	— 500	+ 405	+ 351	+ 052	+ 001
1860	+ 456	— 459	— 206	+ 583	+ 237	+ 289	— 198	— 478	+ 393	+ 413	— 083	+ 037
1861	+ 415	— 173	— 290	+ 334	+ 282	+ 241	— 093	— 203	+ 318	+ 271	— 051	— 076
1862	+ 432	— 196	— 198	+ 424	+ 145	+ 159	— 020	— 263	+ 353	+ 341	— 099	— 092
1856 to } 1862 }	+ 452	— 192	— 214	+ 405	+ 188	+ 198	— 103	— 329	+ 321	+ 271	+ 013	+ 026

TABLE XLIII.

ANNUAL AND SEMI-ANNUAL MEANS AND SEMI-ANNUAL INEQUALITY OF THE SOLAR DIURNAL
VARIATION OF VERTICAL FORCE—YEAR ENDING 31st DECEMBER.

Toronto Astro- nomical Time.	WINTER.						SUMMER.					
	18	20	2	4	10	12	18	20	2	4	10	12
	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1856	— 074	— 013	+ 037	+ 097	+ 041	— 003	+ 031	— 053	+ 023	+ 109	+ 037	— 033
1857	— 041	+ 007	+ 059	+ 108	+ 011	— 058	+ 044	— 011	+ 004	+ 099	+ 019	— 041
1858	— 072	— 064	+ 039	+ 107	+ 056	— 023	— 002	— 022	+ 004	+ 135	+ 043	— 048
1859	— 109	— 059	+ 052	+ 162	+ 045	— 004	— 007	— 086	+ 029	+ 136	+ 055	— 014
1860	— 087	— 027	+ 041	+ 131	+ 052	— 016	— 008	— 039	+ 055	+ 146	+ 041	— 041
1861	— 103	— 081	+ 104	+ 106	+ 060	— 003	— 017	— 058	+ 038	+ 154	+ 031	— 035
1862	— 160	— 064	+ 100	+ 134	+ 073	+ 014	— 080	— 064	+ 070	+ 198	+ 052	— 061
1856 to 1862 }	— 092	— 043	+ 069	+ 121	+ 048	— 013	— 006	— 055	+ 032	+ 140	+ 040	— 039

Toronto Astro- nomical Time.	YEAR.						SEMI-ANNUAL INEQUALITY.—The signs are those proper to the half year from April to September inclusive.					
	18	20	2	4	10	12	18	20	2	4	10	12
	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1856	— 022	— 033	+ 030	+ 103	+ 039	— 018	+ 053	— 020	— 007	+ 006	— 002	— 015
1857	+ 001	— 002	+ 031	+ 103	+ 015	— 049	+ 043	— 009	— 027	— 004	+ 004	+ 003
1858	— 037	— 043	+ 047	+ 121	+ 049	— 036	+ 035	+ 021	— 043	+ 014	— 006	— 012
1859	— 058	— 073	+ 010	+ 149	+ 050	— 009	+ 051	— 013	— 011	— 013	+ 005	— 005
1860	— 047	— 058	+ 048	+ 138	+ 046	— 029	+ 039	— 031	+ 007	+ 008	— 005	— 012
1861	— 060	— 070	+ 071	+ 130	+ 045	— 019	+ 043	+ 012	— 033	+ 024	— 014	— 016
1862	— 120	— 064	+ 085	+ 166	+ 063	— 023	+ 040	000	— 015	+ 032	— 011	— 038
1856 to 1862 }	— 049	— 049	+ 050	+ 130	+ 044	— 026	+ 043	— 006	— 018	+ 010	— 004	— 013

TABLE XLIV.

ANNUAL AND SEMI-ANNUAL MEANS, AND SEMI-ANNUAL INEQUALITY OF THE SOLAR DIURNAL VARIATION OF TOTAL FORCE.—YEAR ENDING 31st DECEMBER.

Toronto Astro- nomical Time.	WINTER.						SUMMER.					
	18	20	2	4	10	12	18	20	2	4	10	12
	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1856	— 026	— 004	+ 025	+ 111	+ 035	— 004	+ 053	— 068	+ 034	+ 127	+ 025	— 018
1857	— 006	+ 026	+ 037	+ 110	+ 016	— 048	+ 066	— 047	+ 019	+ 124	+ 032	— 024
1858	— 028	— 043	+ 036	+ 108	+ 062	— 017	+ 013	— 058	+ 005	+ 171	+ 059	— 024
1859	— 057	— 040	— 007	+ 159	+ 056	+ 012	+ 022	— 129	+ 024	+ 177	+ 072	+ 002
1860	— 040	— 024	— 009	+ 133	+ 069	+ 001	+ 009	— 143	+ 063	+ 200	+ 057	— 018
1861	— 064	— 074	+ 059	+ 103	+ 077	+ 022	+ 005	— 078	+ 037	+ 183	+ 044	— 022
1862	— 120	— 056	+ 058	+ 130	+ 084	+ 029	— 049	— 089	+ 076	+ 234	+ 052	— 052
1856 to } 1862 }	— 049	— 031	+ 028	+ 122	+ 057	— 001	+ 017	— 087	+ 037	+ 174	+ 049	— 022

Toronto Astro- nomical Time.	YEAR.						SEMI-ANNUAL INEQUALITY.—The signs are those proper to the half-year from April to September inclusive.					
	18	20	2	4	10	12	18	20	2	4	10	12
	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1856	+ 013	— 036	+ 029	+ 119	+ 030	— 011	+ 040	— 032	+ 005	+ 008	— 005	— 007
1857	+ 030	— 011	+ 028	+ 117	+ 024	— 036	+ 036	— 036	— 009	+ 007	+ 008	+ 012
1858	— 007	— 051	+ 021	+ 139	+ 061	— 020	+ 020	— 007	— 016	+ 032	— 002	— 004
1859	— 018	— 084	+ 008	+ 168	+ 064	+ 007	+ 040	— 045	+ 016	+ 009	+ 006	— 005
1860	— 015	— 084	+ 027	+ 167	+ 063	— 009	+ 024	— 059	+ 036	+ 033	— 006	— 009
1861	— 030	— 076	+ 048	+ 143	+ 061	000	+ 035	— 002	— 011	+ 040	— 017	— 022
1862	— 085	— 073	+ 067	+ 182	+ 068	— 012	+ 036	— 016	+ 009	+ 052	— 016	— 040
1856 to } 1862 }	— 016	— 059	+ 033	+ 148	+ 053	— 012	+ 033	— 028	+ 004	+ 026	— 004	— 010

TABLE XLV.

ANNUAL AND SEMI-ANNUAL MEANS AND SEMI-ANNUAL INEQUALITY OF THE SOLAR DIURNAL
VARIATION OF INCLINATION—YEAR ENDING 31st DECEMBER.

Toronto Astro- nomical Time.	WINTER.						SUMMER.					
	18	20	2	4	10	12	18	20	2	4	10	12
1856	—26.7	— 6.6	+10.1	—11.3	+ 4.5	+ 1.2	—17.2	+11.6	— 8.3	—14.1	— 5.1	—12.6
1857	—27.3	—10.6	+17.9	— 1.4	+ 0.9	— 8.0	—17.7	+28.1	—11.6	—19.9	—10.2	—13.0
1858	—34.8	— 7.0	+37.7	— 0.4	— 4.9	— 5.0	—12.1	+25.0	— 0.7	—28.5	—12.7	—19.0
1859	—40.6	—15.3	+46.4	+ 2.1	— 8.9	—12.2	—23.0	+33.7	+ 4.4	—32.6	—13.9	—12.9
1860	—37.4	— 2.3	+39.5	— 2.0	—13.6	—14.2	—13.4	+42.7	— 6.7	—42.9	— 5.2	—18.4
1861	—30.8	— 5.6	+35.8	+ 2.2	—13.8	—16.0	—17.0	+16.0	+ 0.5	—22.7	—10.1	—10.2
1862	—30.8	— 6.6	+32.8	+ 2.6	— 8.6	—12.0	—24.8	+19.9	— 4.3	—28.5	+ 0.3	— 6.4
1856 to } 1862 }	—32.6	— 7.7	+31.4	— 1.2	— 6.3	— 9.4	—17.9	+25.3	— 3.8	—27.0	— 8.1	—13.2

Toronto Astro- nomical Time.	YEAR.						SEMI-ANNUAL INEQUALITY.—The signs are those proper to the half-year from April to September inclusive.					
	18	20	2	4	10	12	18	20	2	4	10	12
1856	—22.0	+ 2.5	+ 0.9	—12.7	— 0.3	— 5.7	+ 4.8	+ 9.1	— 9.2	— 1.4	— 4.8	— 6.9
1857	—22.5	+ 8.8	+ 3.2	—10.7	— 4.6	—10.5	+ 4.8	+19.3	—14.8	— 9.2	— 5.6	— 2.5
1858	—23.4	+ 9.0	+18.5	—14.4	— 8.8	—12.0	+11.3	+16.0	—19.2	—14.1	— 3.9	— 7.0
1859	—31.8	+ 9.2	+25.4	—15.3	—11.4	—12.5	+ 8.9	+24.5	—21.0	—17.3	— 2.5	— 0.4
1860	—25.4	+20.2	+16.4	—22.4	— 9.4	—16.3	+12.0	+22.5	—23.1	—20.5	+ 4.2	— 2.1
1861	—23.9	+ 5.2	+18.2	—10.2	—11.9	—13.1	+ 6.9	+10.8	—17.7	—12.5	+ 1.8	+ 2.9
1862	—27.8	+ 6.6	+14.2	—13.0	— 4.2	— 9.2	+ 3.0	+13.3	—18.5	—15.6	+ 4.5	+ 2.8
1856 to } 1862 }	—25.3	+ 8.8	+13.8	+14.1	— 7.2	—11.3	+ 7.4	+16.5	—17.6	—12.9	— 0.9	— 1.9

TABLE XLVI.

Mean solar diurnal variation of the magnetical elements for each month, for the two half-years and for the year, derived from the observations of seven years ending December 31, 1862.

TORONTO ASTRONOMICAL TIME.	January.	February.	March.	April.	May.	June.	July.	August.	Septemb.	October.	November.	Decemb.	WINTER.	SUMMER.	Year.
DECLINATION.															
18	+0.96	+1.57	+2.30	+3.76	+5.27	+5.80	+5.89	+5.99	+4.84	+1.82	+1.85	+0.73	+1.54	+5.82	+3.38
20	+2.91	+3.57	+5.08	+6.84	+6.06	+6.65	+7.04	+8.10	+6.36	+4.78	+3.04	+2.01	+3.56	+6.74	+5.15
2	-3.55	-3.70	-5.70	-6.76	-6.19	-6.51	-6.73	-7.45	-5.09	-4.85	-3.91	-3.48	-4.19	-6.55	-5.38
4	-1.94	-2.09	-5.28	-3.80	-3.27	-3.89	-4.07	-3.33	-2.07	-2.50	-2.13	-2.13	-2.43	-3.40	-2.83
10	+1.16	+1.86	+0.84	+0.30	+0.07	-0.31	-0.34	+0.06	-0.04	+0.50	+1.08	+1.04	+0.96	+0.07	+0.52
12	+0.57	+0.96	+0.97	+1.18	+0.58	+0.19	+0.58	+0.48	+0.26	+0.52	+0.90	+0.00	+0.75	+0.58	+0.67
HORIZONTAL FORCE.															
18	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
20	+ 507	+ 354	+ 572	+ 399	+ 315	+ 297	+ 201	+ 355	+ 517	+ 631	+ 595	+ 474	+ 566	+ 349	+ 452
2	+ 410	+ 369	+ 013	- 272	- 449	- 507	- 623	- 703	- 794	- 274	+ 055	+ 279	+ 137	- 581	- 192
2	- 558	- 715	- 628	- 277	+ 308	+ 218	+ 262	+ 233	- 098	- 481	- 316	- 560	- 535	+ 107	- 214
4	+ 177	- 039	+ 324	+ 612	+ 382	+ 727	+ 906	+ 682	+ 548	+ 232	+ 072	+ 097	+ 133	+ 676	+ 405
10	+ 159	+ 120	+ 177	+ 172	+ 086	+ 162	+ 045	+ 203	+ 541	+ 225	+ 225	+ 136	+ 171	+ 201	+ 188
12	+ 161	+ 192	+ 182	+ 241	+ 190	+ 077	+ 080	+ 307	+ 447	+ 203	+ 209	+ 090	+ 173	+ 234	+ 196
VERTICAL FORCE.															
18	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
20	- 091	- 094	- 098	- 087	- 017	- 019	- 008	+ 031	+ 006	- 086	- 071	- 113	- 092	- 006	- 049
2	- 033	- 029	- 071	- 034	- 044	- 061	- 062	- 044	- 062	- 017	- 035	- 074	- 043	- 055	- 049
2	+ 067	+ 081	+ 089	+ 043	+ 029	- 015	+ 008	+ 040	+ 085	+ 048	+ 063	+ 094	+ 069	+ 032	+ 060
4	+ 069	+ 129	+ 161	+ 154	+ 140	+ 115	+ 141	+ 147	+ 141	+ 110	+ 107	+ 117	+ 121	+ 140	+ 130
10	+ 029	+ 066	+ 044	+ 055	+ 053	+ 051	+ 055	+ 004	+ 029	+ 065	+ 036	+ 069	+ 048	+ 040	+ 044
12	- 002	+ 015	- 013	- 013	- 039	- 031	- 011	- 057	- 062	- 032	- 047	+ 003	- 013	- 039	- 026
TOTAL FORCE.															
18	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
20	- 053	- 053	- 066	.000	+ 005	+ 001	+ 005	+ 052	+ 032	- 040	- 028	- 075	- 049	+ 017	- 016
2	- 004	- 004	- 067	- 049	- 070	- 090	- 117	- 090	- 109	- 083	- 029	- 052	- 031	- 067	- 069
2	+ 027	- 016	+ 044	+ 023	+ 047	.000	+ 027	+ 053	+ 073	+ 018	+ 049	+ 052	+ 028	+ 067	+ 033
4	+ 095	+ 123	+ 171	+ 183	+ 163	+ 154	+ 189	+ 181	+ 166	+ 118	+ 105	+ 115	+ 122	+ 174	+ 148
10	+ 038	+ 069	+ 052	+ 062	+ 065	+ 058	+ 054	+ 017	+ 061	+ 066	+ 053	+ 064	+ 057	+ 049	+ 053
12	+ 008	+ 026	.000	+ 003	- 025	- 025	- 005	- 034	- 048	- 017	- 030	+ 008	- 001	- 022	- 012
INCLINATION.															
18	-30.2	-32.7	-33.8	-21.4	-16.7	-15.9	-10.6	-16.3	-24.3	-36.1	-35.5	-20.5	-32.6	-17.9	-25.2
20	-22.2	-20.0	- 2.9	+12.0	+20.4	+22.4	+27.3	+26.2	+26.9	+12.9	- 4.5	-17.8	- 7.7	+25.2	+ 8.8
2	+31.5	+27.6	+26.1	+16.1	-14.1	-11.7	-12.8	- 9.7	+ 9.2	+24.1	+26.3	+23.9	+31.4	- 8.8	+12.6
4	- 4.4	+ 9.0	- 8.2	-23.1	-22.3	-30.8	-33.5	-27.0	-20.5	- 6.2	+ 1.8	+ 1.0	- 1.2	-27.0	-14.1
10	- 6.6	- 2.7	- 6.7	- 5.9	- 1.7	- 5.6	+ 0.5	-10.0	-25.8	- 8.6	- 9.6	- 3.9	- 6.3	- 9.1	- 7.2
12	- 8.2	- 8.9	-10.3	-12.8	-11.6	- 5.5	- 4.6	-15.3	-26.6	-11.8	-12.9	- 4.4	- 9.4	-12.2	-11.3

TABLE XLVII.

Comparative view of the annual and semi-annual means, and semi-annual inequality of the diurnal variation of the magnetic elements, as derived from the five years terminating June 30, 1848, and from the seven years terminating June 30, 1862.

TORONTO ASTRONOMICAL TIME.	WINTER.						SUMMER.					
	18	20	2	4	10	12	18	20	2	4	10	12
<i>Declination</i> { 1844-48	+1.39	+3.05	-3.73	-2.00	+0.93	+0.63	+4.58	+5.82	-6.01	-2.96	+0.47	+0.63
1856-62	+1.52	+3.48	-4.09	-2.37	+1.02	+0.72	+5.18	+6.63	-6.47	-3.35	+0.11	+0.59
<i>Hor. Force</i> { 1844-48	+0.00033	-0.00003	-0.00019	+0.00037	+0.00013	+0.00004	+0.00005	-0.00041	+0.00045	+0.00085	+0.00006	-0.00002
1856-62	+0.00052	+0.00014	-0.00030	+0.00014	+0.00062	+0.00018	+0.00037	-0.00032	+0.00019	+0.00054	+0.00029	+0.00037
<i>Ver. Force</i> { 1844-48	-0.00030	-0.00024	+0.00043	+0.00036	+0.00039	-0.00007	+0.00003	-0.00033	+0.00036	+0.00117	+0.00017	-0.00030
1856-62	-0.00082	-0.00040	+0.00064	+0.00118	+0.00044	-0.00014	-0.00002	-0.00046	+0.00029	+0.00131	+0.00038	-0.00040
<i>Total Force</i> { 1844-48	-0.00006	-0.00024	+0.00028	+0.00036	+0.00045	-0.00003	+0.00009	-0.00038	+0.00064	+0.00165	+0.00020	-0.00029
1856-62	-0.00040	-0.00028	+0.00026	+0.00118	+0.00052	-0.00002	+0.00023	-0.00080	+0.00035	+0.00164	+0.00047	-0.00023
<i>Inclination</i> { 1844-48	-18.2	-0.3	+11.8	-15.3	-4.6	-2.5	-2.2	+19.1	-21.0	-37.2	-2.2	-0.5
1856-62	-31.9	-7.9	+29.5	-1.8	-6.0	-8.7	-17.4	+26.3	-4.5	-26.3	-8.6	-13.9

TORONTO ASTRONOMICAL TIME.	YEAR.						SEMI-ANNUAL INEQUALITY.					
	18	20	2	4	10	12	The signs are those proper to the half year, from April to September inclusive.					
<i>Declination</i> { 1844-48	+2.96	+4.44	-4.87	-2.46	+0.70	+0.63	+1.60	+1.38	-1.14	-0.48	-0.23	-0.01
1856-62	+3.32	+5.03	-5.27	-2.85	+0.57	+0.64	+1.86	+1.60	-1.20	-0.50	-0.46	-0.06
<i>Hor. Force</i> { 1844-48	+0.00019	-0.00023	+0.00013	+0.00061	+0.00010	+0.00001	-0.00014	-0.00019	+0.00032	+0.00024	-0.00004	-0.00003
1856-62	+0.00040	-0.00019	-0.00019	+0.00036	+0.00018	+0.00017	-0.00010	-0.00040	+0.00032	+0.00028	+0.00025	+0.00040
<i>Ver. Force</i> { 1844-48	-0.00012	-0.00029	+0.00040	+0.00091	+0.00028	-0.00019	+0.00018	-0.00004	-0.00004	+0.00026	-0.00011	-0.00011
1856-62	-0.00041	-0.00043	+0.00017	+0.00123	+0.00041	-0.00027	+0.00037	-0.00003	-0.00018	+0.00006	-0.00003	-0.00013
<i>Total Force</i> { 1844-48	+0.00001	-0.00041	+0.00046	+0.00125	+0.00032	-0.00017	+0.00008	-0.00017	+0.00018	+0.00040	-0.00012	-0.00012
1856-62	+0.00004	-0.00054	+0.00030	+0.00141	+0.00049	-0.00012	+0.00019	-0.00026	+0.00005	+0.00023	-0.00003	-0.00010
<i>Inclination</i> { 1844-48	-10.3	+9.7	-4.7	-26.2	-3.5	-1.5	+8.1	+9.4	-16.3	-11.0	+1.3	+1.0
1856-62	-24.7	+9.0	+12.6	-14.0	-7.2	-11.2	+7.3	-17.3	-17.1	-12.3	-1.4	-2.7

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JULY, 1853.						AUGUST, 1853.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	...	...	...	...	...	-1.59	+ .00017	-.00008	-.00007	- 13"
2	...	...	...	...	...	+1.15	- 40	- 09	- 11	+ 16
3	...	...	...	...	...	+0.25	- 35	- 06	- 08	+ 15
4	+1.18	+ .00067	+ .00010	+ .00013	- 29"	-0.73	+ 33	- 02	00	- 18
5	+0.07	+ 112	- 15	- 07	- 64	-0.01	+ 12	+ 14	+ 14	+ 1
6	+0.97	+ 095	- 13	- 06	- 55	+0.89	+ 57	- 04	00	- 31
7	+0.93	+ 075	- 13	- 07	- 44	...	...	...	...	...
8	+2.61	+ 074	- 11	- 06	- 43	+2.86	+ 22	+ 11	+ 12	- 5
9	+1.33	+ 050	- 02	+ 01	- 26	+1.51	- 63	- 02	- 06	+ 31
10	...	...	...	...	...	+0.52	+ 04	+ 13	+ 13	+ 5
11	+2.05	+ 066	- 07	- 02	- 37	+1.48	+ 03	+ 17	+ 16	+ 7
12	+6.01	- 169	- 67	- 73	+ 51	+0.04	- 18	+ 22	+ 20	+ 21
13	+1.15	- 199	+ 35	+ 20	+ 118	+3.02	+ 43	+ 24	+ 25	- 9
14	-2.38	- 096	+ 05	- 01	+ 51	...	...	...	...	...
15	+0.57	- 002	+ 27	+ 25	+ 15	-0.83	+ 10	+ 14	+ 14	+ 2
16	-0.45	- 063	- 13	- 16	+ 25	-0.09	+ 81	+ 11	+ 15	- 35
17	...	...	...	...	...	+0.22	+ 34	+ 06	+ 08	- 14
18	+0.07	- 027	- 05	- 06	+ 11	+0.22	+ 64	- 20	- 14	- 42
19	-0.32	+ 009	- 07	- 06	- 8	-1.69	+ 06	- 28	- 26	- 17
20	-0.68	- 045	- 10	- 12	+ 18	-0.04	+ 10	- 34	- 31	- 22
21	-0.35	+ 041	- 03	00	- 22	...	...	...	...	...
22	+3.43	- 008	- 06	- 06	+ 1	+1.69	+ 25	- 54	- 49	- 40
23	+1.42	- 052	+ 08	+ 05	+ 30	+0.01	- 46	- 29	- 30	+ 9
24	...	...	...	...	...	+2.08	- 15	- 20	- 20	- 3
25	-2.12	- 054	+ 07	+ 03	+ 31	- 1.64	- 04	- 34	- 32	- 15
26	-1.21	- 024	+ 12	+ 10	+ 18	+0.30	- 71	- 02	- 06	+ 35
27	-0.58	- 037	+ 11	+ 08	+ 24	-2.16	- 61	- 31	- 33	+ 15
28	-0.92	- 046	00	- 03	+ 24	...	...	...	...	...
29	+0.54	- 064	+ 05	+ 01	+ 35	-0.72	- 27	- 04	- 06	+ 11
30	+1.09	+ 028	+ 21	+ 22	- 3	-0.98	- 25	- 04	- 06	+ 10
31	...	...	...	...	...	-0.40	- 13	+ 16	+ 14	+ 15
Absolute values } 1° 44'.78						75° 21' 29" 1° 48'.07				
						75° 20' 15'				

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

SEPTEMBER, 1853.						OCTOBER, 1853.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+4.78	-.00136	-.00087	-.00090	+ 25"	+0.26	+.00003	.00000	.00000	- 1
2	+4.20	- 469	- 53	- 79	+ 210	...	...	...	...	...
3	-0.48	- 199	- 07	- 20	+ 97	-0.55	+ 29	+ 002	+ 04	- 13
4	...	...	...	...	...	+0.04	+ 03	+ 006	+ 06	+ 2
5	-0.15	- 019	+ 27	+ 24	+ 23	+0.02	+ 27	+ 026	+ 26	- 1
6	+1.95	- 157	- 19	- 27	+ 70	-0.42	+ 50	- 013	- 09	- 32
7	+0.62	- 009	+ 12	+ 10	+ 11	+0.60	+ 36	- 010	- 07	- 23
8	-0.77	- 013	+ 09	+ 08	+ 11	+0.74	+ 44	- 003	00	- 24
9	+0.38	+ 015	+ 19	+ 19	+ 2	...	...	...	...	...
10	-0.21	+ 024	- 06	- 04	- 15	+0.44	- 16	+ 009	+ 07	+ 13
11	...	...	...	...	...	+0.96	- 21	- 037	- 36	- 8
12	+0.02	+ 019	- 12	- 10	- 16	+1.84	+ 28	- 020	- 17	- 25
13	+0.24	+ 013	- 16	- 14	- 15	-0.12	+ 53	- 010	- 06	- 32
14	+0.04	+ 019	- 06	- 04	- 12	+0.62	+ 05	- 014	- 12	- 10
15	+0.10	+ 014	- 20	- 18	- 18	-1.47	- 62	- 027	- 29	+ 18
16	-0.30	+ 010	+ 22	+ 21	+ 6	...	...	...	...	...
17	-0.34	+ 019	+ 10	+ 11	- 5	-0.43	- 59	+ 004	00	+ 32
18	...	...	...	...	...	-1.81	- 77	- 012	- 16	+ 33
19	-0.91	- 048	+ 19	+ 15	+ 34	-0.53	- 08	+ 002	+ 02	+ 5
20	-0.24	- 063	+ 19	+ 14	+ 41	+0.35	- 35	+ 014	+ 11	+ 25
21	+0.48	- 013	+ 08	+ 07	+ 11	-0.72	+ 13	+ 022	+ 21	+ 4
22	-0.03	+ 038	- 06	- 03	- 22	-0.63	- 08	+ 030	+ 28	+ 19
23	+0.91	+ 027	+ 11	+ 12	- 8	...	...	...	...	...
24	-0.55	+ 055	- 05	- 02	- 30	-1.47	- 76	- 015	- 19	+ 30
25	...	...	...	...	...	-0.03	- 26	+ 004	+ 02	+ 15
26	-1.56	- 038	- 29	- 30	+ 4	+1.26	- 33	- 011	- 13	+ 11
27	+1.43	- 167	- 14	- 23	+ 77	-0.37	- 66	+ 024	+ 18	+ 45
28	-0.82	- 173	- 62	- 69	+ 56	-0.68	- 12	+ 023	+ 21	+ 18
29	-0.70	- 060	+ 04	00	+ 32	-0.50	- 17	+ 006	+ 04	+ 11
30	-1.40	- 034	- 13	- 14	+ 11	...	...	...	...	...
31	...	...	...	...	...	-5.38	- 59	+ 107	+ 96	+ 84
Absolute values } 75° 21' 41"						75° 22' 24"				

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

NOVEMBER, 1853.						DECEMBER, 1853.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	+0.48	-.00091	+.00034	+.00026	+ 63"	+1.56	+.00078	-.00011	-.00006	- 45"	
2	+0.41	- 100	- 01	- 07	+ 50	+0.08	+ 031	- 11	- 08	- 21	
3	+0.50	- 014	- 09	- 10	+ 2	+1.00	+ 043	+ 13	+ 15	- 15	
4	-0.60	- 031	- 23	- 23	+ 4	...	...	...	...	...
5	+0.10	- 026	- 30	- 29	- 2	+0.20	+ 056	- 15	- 10	- 36	
6	...	...	...	...	...	-3.21	- 047	+ 62	+ 55	+ 55	
7	-0.12	+ 001	- 36	- 33	- 18	-1.49	- 134	+ 21	+ 11	+ 78	
8	-1.09	- 036	- 21	- 22	+ 8	-0.69	- 063	- 06	- 10	+ 29	
9	+0.46	- 240	- 32	- 45	+ 105	-0.19	+ 013	- 02	- 01	- 8	
10	-1.09	- 152	- 05	- 15	+ 74	+0.19	+ 041	+ 15	+ 17	- 13	
11	-1.09	- 092	+ 01	- 04	+ 47	...	...	...	...	...
12	+0.29	- 057	+ 10	+ 06	+ 34	+1.32	+ 099	+ 20	+ 25	- 40	
13	...	...	...	...	...	-2.33	- 131	+ 02	- 06	+ 67	
14	+0.40	- 019	+ 09	+ 07	+ 14	+0.17	- 018	+ 16	+ 14	+ 17	
15	+0.60	+ 030	+ 16	+ 17	- 7	+0.75	- 024	+ 41	+ 37	+ 38	
16	+0.30	- 001	- 03	- 03	- 1	-0.19	+ 036	+ 18	+ 19	- 9	
17	+0.81	+ 010	+ 05	+ 05	- 3	-0.73	- 016	- 22	- 22	- 3	
18	+0.46	+ 014	+ 22	+ 21	+ 4	...	...	...	...	...
19	+0.57	- 016	+ 41	+ 37	+ 29	-1.12	- 004	- 45	- 42	- 21	
20	...	...	...	...	...	-0.98	+ 039	- 28	- 24	- 34	
21	+0.72	+ 029	+ 29	+ 29	0	-2.24	- 036	+ 14	+ 10	+ 25	
22	-2.25	- 053	+ 44	+ 38	+ 49	-0.45	- 077	+ 06	00	+ 42	
23	+0.42	+ 040	+ 34	+ 35	- 3	-1.58	- 081	00	- 05	+ 41	
24	-0.26	+ 033	- 12	- 09	- 23	+0.42	- 046	- 05	- 08	+ 21	
25	+0.01	+ 051	- 45	- 39	- 48	...	...	...	...	...
26	-0.11	+ 057	- 38	- 32	- 48	...	...	...	...	...
27	...	...	...	...	...	+0.74	- 007	+ 07	+ 07	+ 7	
28	-0.87	+ 090	- 22	- 15	- 56	+1.14	- 008	- 42	- 40	- 17	
29	-0.04	+ 081	+ 12	+ 16	- 35	-0.05	- 016	- 80	- 76	- 32	
30	-0.40	+ 075	- 12	- 07	- 44	+0.57	- 045	- 13	- 15	+ 16	
...	...	...	...	...	...	+0.06	- 014	- 21	- 20	- 3	
Absolute values }					75° 23' 0"						75° 22' 20"

TORONTO MAGNETICAL OBSERVATIONS.

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JANUARY, 1854.						FEBRUARY, 1854.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	...	...	...	...	...	+1.99	+0.0066	+0.0055	+0.0056	— 5"
2	—2.93	—0.0140	+0.0018	+0.0008	+ 79"	+1.35	+ 048	00	+ 03	— 24
3	—1.18	— 128	— 12	— 20	+ 58	+1.80	+ 058	— 07	— 03	— 33
4	+0.55	— 033	+ 25	+ 22	+ 30	+1.18	+ 003	— 15	— 14	— 9
5	+0.12	+ 047	+ 11	+ 14	— 18	...	...	...	...	...
6	+0.19	+ 011	— 18	— 16	— 15	+0.89	+ 036	— 18	— 15	— 27
7	+1.29	+ 005	— 22	— 20	— 13	—0.27	+ 015	+ 02	+ 03	— 6
8	...	...	...	...	...	—0.40	+ 044	+ 10	+ 12	— 17
9	—0.19	— 022	— 15	— 16	+ 4	+0.16	+ 077	+ 17	+ 21	— 30
10	+0.46	— 006	— 17	— 16	— 6	+1.04	+ 004	+ 44	+ 42	+ 21
11	—0.03	+ 021	+ 07	+ 08	— 7	+0.17	— 118	— 71	— 74	+ 24
12	—0.22	+ 044	+ 30	+ 31	— 7	...	...	...	...	...
13	+0.22	+ 018	+ 21	+ 20	+ 1	—1.01	+ 012	— 04	— 03	— 8
14	+0.94	000	— 35	— 33	— 18	+2.05	— 069	+ 24	+ 18	+ 47
15	...	...	...	...	...	—0.29	— 101	+ 42	+ 33	+ 72
16	+2.40	— 024	— 19	— 19	+ 3	+1.79	— 161	+ 16	+ 05	+ 90
17	+1.03	— 046	— 08	— 11	+ 19	+1.78	— 038	— 03	— 05	+ 18
18	—0.80	— 036	— 19	— 20	+ 9	—1.68	— 065	— 22	— 25	+ 22
19	+0.19	+ 010	+ 03	+ 03	— 4	...	...	...	...	...
20	+0.31	— 038	+ 07	+ 04	+ 23	—0.17	+ 022	+ 01	+ 02	— 11
21	—0.34	+ 010	+ 01	+ 01	— 5	+0.12	+ 031	— 09	— 06	— 20
22	...	...	...	...	...	—0.29	+ 048	00	+ 03	— 24
23	—0.75	+ 045	— 10	— 06	— 27	—1.22	+ 030	— 34	— 30	— 33
24	+0.19	— 013	+ 09	+ 07	+ 11	—3.74	000	+ 41	+ 38	+ 21
25	+0.40	— 002	— 28	— 26	— 13	—1.30	— 105	— 20	— 25	+ 43
26	—0.12	+ 067	+ 02	+ 06	— 33	...	...	...	...	...
27	—0.81	+ 051	00	+ 03	— 26	+3.74	— 019	+ 02	+ 01	+ 11
28	—0.94	+ 035	— 22	— 19	— 29	+1.30	+ 020	+ 04	+ 05	— 8
29	...	...	...	...	...	...	...	...	...	...
30	—2.38	— 080	+ 21	+ 15	+ 51	...	...	...	...	...
31	—0.03	— 024	+ 35	+ 32	+ 30	...	...	...	...	...
Absolute values					75° 21' 24"	1° 44'.88				75° 2' 18"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MARCH, 1854.						APRIL, 1854.					
Day of Month.	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	-1'.18	-.00042	+.00005	+.00002	+ 24"	-0'.06	.00000	-.00011	-.00010	- 5"	
2	-0.53	- 044	- 001	- 003	+ 22	...	...	...	...	...
3	-0.91	- 010	+ 015	+ 013	+ 13	+0.37	+ 003	- 018	- 017	- 11	
4	-2.03	- 027	- 006	- 007	+ 11	+0.19	+ 005	- 009	- 008	- 7	
5	...	...	...	...	...	-0.68	- 004	+ 020	+ 019	+ 12	
6	-1.54	- 064	- 016	- 019	+ 24	+0.71	+ 044	+ 032	+ 032	- 6	
7	-2.39	- 009	- 010	- 010	0	-0.17	+ 018	+ 007	+ 008	- 6	
8	+0.17	+ 035	- 005	- 003	- 21	+0.84	+ 039	+ 005	+ 007	- 17	
9	+0.21	- 008	- 009	- 009	0	...	...	...	...	...
10	+0.76	+ 028	- 005	- 003	- 17	-2.59	- 661	- 119	- 153	+ 273	
11	-0.45	+ 049	- 027	- 022	- 38	-2.31	- 220	- 056	- 066	+ 83	
12	...	...	...	...	...	-0.18	- 027	+ 018	+ 015	+ 23	
13	-0.66	+ 024	+ 030	+ 029	+ 3	-0.13	- 029	+ 012	+ 009	+ 20	
14	+2.37	+ 036	- 002	000	- 19	...	...	...	...	...
15	+0.74	- 162	- 010	- 019	+ 77	-1.39	- 080	- 017	- 021	+ 32	
16	+0.57	- 071	+ 114	+ 102	+ 94	...	...	...	...	...
17	-0.30	- 022	- 003	- 004	+ 9	+0.64	+ 007	- 007	- 006	- 7	
18	-0.01	- 056	+ 004	000	+ 30	+1.00	+ 095	- 018	- 011	- 57	
19	...	...	...	...	...	+2.25	+ 001	- 020	- 018	- 10	
20	-0.97	- 037	- 004	+ 007	+ 16	+0.23	- 061	+ 017	+ 012	+ 45	
21	-0.77	+ 047	+ 014	+ 016	- 17	-0.38	- 016	+ 030	+ 027	+ 23	
22	-0.03	+ 084	+ 027	+ 030	- 29	-0.51	- 029	+ 012	+ 010	+ 21	
23	+0.50	+ 011	+ 019	+ 018	+ 4	...	...	...	...	...
24	+0.48	+ 027	- 010	- 008	- 19	-2.27	- 121	- 014	- 021	+ 54	
25	+2.04	- 033	- 037	- 037	- 2	-0.02	- 022	+ 036	+ 033	+ 30	
26	...	...	...	...	...	+0.47	- 007	+ 015	+ 014	+ 11	
27	+2.42	- 065	- 049	- 050	+ 8	+1.74	+ 056	- 030	- 024	- 43	
28	+3.59	- 207	+ 044	+ 028	+ 127	+0.75	+ 022	- 027	- 023	- 24	
29	+0.09	- 126	- 018	- 025	+ 54	-0.62	+ 003	- 028	- 026	- 16	
30	+1.43	- 030	- 006	- 007	+ 12	...	...	...	...	...
31	-0.35	- 067	+ 001	- 004	+ 34	...	...	...	...	...
Absolute values } 1° 48'. 62						1° 47'. 15					
75° 28' 3"						75° 22' 57"					

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MAY, 1854.						JUNE, 1854.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	+1.74	+ .00029	-.00026	-.00023	- 28"	-0.02	-.00002	-.00010	-.00009	- 4"	
2	+0.22	+ 014	- 27	- 24	- 20	-0.94	+ 28	+ 02	+ 04	- 13	
3	+1.33	+ 010	- 29	- 27	- 20	-1.38	+ 39	+ 02	+ 04	- 19	
4	+1.22	- 002	- 15	- 14	- 7	...	...	...	...	...
5	+1.15	- 008	- 31	- 29	- 12	-0.74	+ 24	+ 09	+ 10	- 8	
6	+0.14	+ 076	- 39	- 31	- 57	-0.51	+ 29	+ 06	+ 07	- 11	
7	...	...	...	...	...	+1.77	- 34	- 15	- 16	+ 9
8	+1.67	+ 095	- 16	- 09	- 56	-0.13	+ 02	- 23	- 21	- 12	
9	-2.28	- 008	- 04	- 05	+ 2	+0.23	- 08	- 30	- 29	- 11	
10	-0.71	+ 037	- 17	- 14	- 28	-0.73	+ 22	+ 12	+ 13	- 5	
11	+1.33	+ 035	+ 01	+ 03	- 17	...	...	...	...	...
12	-1.03	+ 018	+ 06	+ 06	- 6	+3.04	- 30	- 06	- 08	+ 12	
13	-0.07	+ 024	+ 17	+ 18	- 3	-1.04	- 76	+ 04	- 01	+ 41	
14	...	...	...	...	...	+0.73	- 24	+ 12	+ 10	+ 18
15	-1.30	+ 006	+ 19	+ 18	+ 7	-0.80	- 49	+ 18	+ 14	+ 34	
16	+0.36	- 080	+ 10	+ 04	+ 45	+1.70	- 24	+ 07	+ 05	+ 15	
17	-0.08	- 131	+ 06	- 03	+ 69	-1.32	- 31	- 18	- 19	+ 7	
18	+0.05	- 048	+ 08	+ 04	+ 28	...	...	...	...	...
19	-1.41	- 035	+ 12	+ 09	+ 24	-0.27	+ 26	- 11	- 09	- 19	
20	-0.31	- 060	- 08	- 11	+ 26	-0.75	- 25	- 18	- 18	+ 4	
21	...	...	...	...	...	-0.97	- 20	+ 01	00	+ 11
22	+0.55	- 052	+ 02	- 02	+ 27	+0.59	+ 35	- 02	00	- 19	
23	-0.14	- 008	+ 03	+ 02	+ 6	+2.98	+ 45	- 06	- 03	- 26	
24	...	...	...	...	...	...	...	...	...	...
25	+1.85	+ 026	+ 06	+ 07	- 10	...	...	...	...	...
26	+1.15	- 054	- 10	- 13	+ 22	...	...	...	...	...
27	+1.54	- 022	+ 02	+ 01	+ 12	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...
29	+1.33	- 023	+ 17	+ 14	+ 20	...	...	...	...	...
30	+0.76	+ 015	- 31	- 28	- 23	...	...	...	...	...
31	+1.51	+ 039	- 47	- 42	- 44	...	...	...	...	...
Absolute values }					75° 22' 57"	1° 48' 01"					75° 22' 56"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

AUGUST, 1855.			SEPTEMBER, 1855.					OCTOBER, 1855.				
Day of Month.	$\Delta\Psi$	$\frac{\Delta Y}{Y}$	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
		.000		.00	.000	.000			.00	.000	.000	
1	-0.29	+ 42	+0.84	- 038	- 13	- 15	+ 12"	-1.09	+ 001	- 17	- 16	- 9"
2	+0.37	+ 29	...	...	...	...	...	+0.91	+ 008	- 28	- 25	- 18
3	+1.33	+ 16	-0.21	+ 013	00	+ 01	- 7	-3.05	- 120	- 02	- 10	+ 59
4	-2.15	+ 05	-0.12	+ 043	+ 06	+ 08	- 19	+2.79	- 258	- 19	- 34	+120
5	...	...	+0.06	- 032	- 09	- 11	+ 12	+0.76	- 075	+ 17	+ 12	+ 47
6	+0.33	- 09	+0.97	+ 013	+ 07	+ 07	- 3	-0.12	- 025	00	- 02	+ 12
7	-0.09	- 05	+0.32	+ 053	+ 09	+ 12	- 22					
8	-0.11	+ 10	+0.62	- 003	- 09	- 08	- 3	+0.68	+ 019	00	+ 01	- 9
9	-1.58	+ 02						-1.43	+ 086	- 07	- 01	- 47
10	-2.48	- 22	+1.99	+ 003	+ 12	+ 12	+ 5	+1.06	- 035	- 01	- 03	+ 18
11	-2.53	- 19	-1.92	- 007	+ 09	+ 08	+ 8	+1.58	+ 023	- 14	- 12	- 19
12	...	...	+0.35	+ 038	- 06	- 03	- 22	+0.52	+ 008	+ 01	+ 01	- 4
13	-1.02	- 35	-0.22	+ 053	- 08	- 04	- 31	-0.14	+ 026	- 03	- 01	- 15
14	-0.19	- 14	-0.63	- 019	- 03	- 03	+ 9					
15	+1.33	- 21	-0.10	- 061	- 07	- 11	+ 27	+0.22	- 001	- 10	- 09	- 5
16	+1.43	+ 04						-0.93	+ 003	00	00	- 2
17	+0.42	- 05	-2.55	- 020	- 02	- 04	+ 9	-0.24	+ 064	- 04	00	- 34
18	+0.25	- 11	-0.88	+ 028	- 07	- 05	- 18	-2.71	- 049	+ 21	+ 17	+ 35
19	...	...	-0.82	- 010	- 01	- 02	+ 5	+1.02	- 101	- 02	- 08	+ 50
20	+0.87	- 02	+0.06	- 036	+ 01	- 01	+ 19	-2.12	- 060	+ 06	+ 02	+ 33
21	-0.46	- 15	+0.28	- 035	+ 13	+ 10	+ 24					
22	-0.39	- 28	- 048	- 056	+ 06	+ 02	+ 31	-0.12	+ 039	+ 02	+ 04	- 18
23	-0.88	- 09	-0.45					-0.96	- 008	+ 14	+ 13	+ 11
24	+0.84	+ 01	-0.52	000	+ 05	+ 05	+ 3	-0.02	+ 010	+ 07	+ 07	- 2
25	+0.76	- 02	+0.45	- 024	+ 10	+ 08	+ 17	+0.19	+ 026	+ 04	+ 05	- 11
26	...	...	+0.20	+ 052	- 07	- 03	- 30	+0.30	+ 040	- 03	- 01	- 22
27	+0.68	+ 37	+0.09	- 098	- 15	- 20	+ 42	-0.60	+ 004	- 02	- 01	- 3
28	+0.90	+ 27	+0.35	- 047	+ 01	- 02	+ 25					
29	+1.14	+ 29	+0.37	- 147	- 09	- 18	+ 70	+0.69	+ 050	- 09	- 05	- 29
30	+1.25	+ 15	...	...	...	...	...	-0.82	+ 057	00	+ 04	- 29
31	+0.65	+ 01	...	...	...	...	...	+0.34	+ 043	- 04	- 01	- 24
Absolute values	1°51'.90		1°51'.94	3.52942	13.5572	14.0091	75°24'28"	1°53'.29	3.51237	13.4756	13.9258	75°28'28"

TORONTO MAGNETICAL OBSERVATIONS.

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

NOVEMBER, 1855.						DECEMBER, 1855.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	+0'.04	-.00006	-.00025	-.00024	- 10"	-0'.34	+.00020	+.00007	+.00008	- 7"	
2	-0.57	- 27	- 30	- 30	- 2	...	...	...	...	...
3	-2.19	+ 16	- 06	- 04	- 11	-0.45	+ 27	+ 05	+ 07	- 11	
4	...	...	...	...	...	+0.47	+ 13	+ 02	+ 02	- 6
5	-0.41	- 21	+ 05	+ 03	+ 13	+0.49	- 10	- 03	- 03	+ 4	
6	+0.57	- 85	+ 16	+ 09	+ 51	+0.17	+ 14	+ 03	+ 04	- 6	
7	-0.94	- 34	+ 14	+ 11	+ 24	-0.45	+ 18	+ 13	+ 13	- 3	
8	+1.20	- 03	+ 07	+ 07	+ 5	+0.31	+ 06	+ 16	+ 16	+ 5	
9	-0.19	+ 06	- 01	- 01	- 3	...	...	...	...	...
10	-0.08	- 01	+ 09	+ 09	+ 5	+0.56	+ 61	+ 03	+ 06	- 30	
11	...	...	...	...	...	+0.55	+ 85	+ 01	+ 06	- 42
12	-0.30	- 04	...	...	...	+0.40	+ 07	+ 06	+ 06	- 1
13	-0.34	+ 30	...	...	...	+0.58	- 05	+ 02	+ 02	+ 4
14	+0.09	+ 35	...	...	...	+0.24	+ 06	+ 12	+ 12	+ 3
15	-0.34	+ 40	...	...	...	+0.34	+ 26	+ 04	+ 05	- 11
16	-0.75	- 15	...	...	...	...	...	...	...	...
17	-0.15	- 09	...	...	...	+1.35	- 14	- 08	- 08	+ 3
18	...	...	...	...	...	-1.27	- 87	- 22	- 27	+ 33
19	+0.09	- 20	+ 04	+ 02	+ 12	-0.67	- 45	- 23	- 25	+ 11	
20	-0.22	- 82	- 01	- 06	+ 41	-0.99	- 69	- 14	- 17	+ 28	
21	-1.38	- 67	- 03	- 07	+ 32	+0.24	- 43	- 08	- 10	+ 18	
22	+1.17	+ 15	00	+ 01	- 8	-0.73	- 81	- 17	- 21	+ 32	
23	-0.40	- 58	+ 08	+ 04	+ 34	...	...	...	...	...
24	+0.50	+ 07	- 13	- 11	- 10	-0.09	- 40	- 05	- 07	+ 18	
25	...	...	...	...	...	...	...	...	...	...
26	+0.17	- 16	- 05	- 05	+ 6	-0.31	+ 65	- 18	- 12	- 42	
27	+0.19	+ 06	- 05	- 04	- 5	-0.58	- 23	- 02	- 03	+ 10	
28	-0.14	+ 46	- 01	+ 02	- 24	-0.34	- 10	- 08	- 08	+ 1	
29	-1.83	+ 04	- 20	- 18	- 12	+0.37	+ 17	- 23	- 21	- 20	
30	-0.09	- 38	- 08	- 10	+ 15	...	...	...	...	...
31	...	...	...	...	...	+0.16	- 70	- 02	- 07	+ 34
Absolute values	1°54'.96	3.50970	13.4624	13.9124	75°23'17"	1°54'.99	3.51004	13.4635	13.9135	75°23'16"	

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JANUARY, 1856.						FEBRUARY, 1856.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	-0.03	-.00070	+.00014	+.00009	+ 42"	+0.40	-.00047	-.00007	-.00009	+ 20"
2	-0.27	- 085	+ 11	+ 05	+ 48	-0.70	- 25	- 06	- 07	+ 10
3	-0.30	- 026	+ 12	+ 10	+ 19	...	...	..	...	...
4	+0.08	- 010	00	- 01	+ 5	-0.17	+ 31	- 10	- 08	- 21
5	-0.10	+ 046	+ 06	+ 08	- 20	-0.32	+ 47	- 02	+ 01	- 25
6	...	...	...	...	...	+0.06	+ 02	- 16	- 15	- 9
7	-0.09	- 018	- 06	- 06	+ 6	-0.66	- 43	- 07	- 10	+ 18
8	+0.47	- 026	- 06	- 07	+ 10	+0.13	+ 08	+ 26	+ 25	+ 9
9	-0.03	+ 027	- 13	- 10	- 20	+0.45	- 33	- 10	- 11	+ 11
10	+0.37	+ 063	- 08	- 03	- 36	...	...	...	...	...
11	+0.01	+ 018	+ 02	+ 03	- 8	+0.82	- 39	- 07	- 09	+ 16
12	+0.18	- 011	+ 01	+ 01	+ 6	+1.17	- 81	+ 04	- 02	+ 43
13	...	...	...	...	...	-0.58	- 32	+ 36	+ 32	+ 34
14	-1.04	- 063	+ 04	- 01	+ 34	-0.89	+ 16	- 02	- 01	- 9
15	-0.14	- 065	+ 20	+ 14	+ 43	+0.38	+ 10	- 07	- 06	- 8
16	+0.48	- 131	+ 04	- 04	+ 68	-0.12	+ 10	- 01	00	- 5
17	+0.76	...	+ 05	...	...	...	...	...	...	...
18	+0.25	...	+ 10	...	...	+0.26	- 73	+ 09	+ 04	+ 41
19	+0.78	...	+ 04	...	...	+0.17	+ 70	+ 16	+ 20	- 27
20	...	...	...	...	...	-1.84	- 86	+ 03	- 02	+ 45
21	0.00	- 204	- 17	- 29	+ 94	-0.51	- 51	- 01	- 04	+ 25
22	+0.94	- 055	- 10	- 13	+ 23	-0.33	+ 32	+ 06	+ 08	- 13
23	+0.06	+ 041	- 06	- 03	- 23	+0.31	- 44	- 04	- 07	+ 20
24	+0.12	+ 058	00	+ 04	- 29	...	...	...	...	...
25	-0.57	+ 049	- 26	- 21	- 38	-0.23	+ 34	- 02	+ 01	- 18
26	-0.04	+ 031	- 29	- 25	- 30	+0.09	+ 28	- 03	- 01	- 15
27	...	...	...	...	...	-0.77	- 02	- 10	- 10	- 4
28	+0.18	+ 072	- 11	- 06	- 42	+0.06	+ 47	+ 08	+ 10	- 20
29	-0.71	+ 040	- 14	- 10	- 27	-0.42	+ 39	+ 06	+ 08	- 16
30	+0.07	+ 066	- 14	- 09	- 41	...	...	...	...	...
31	-1.30	- 002	- 01	- 01	+ 1	...	...	...	...	...
Absolute values	1°54'.30	3.50027	13.4330	13.8815	75° 23' 42"	1°55'.33	3.50641	13.4667	13.9157	75°24'20"

TORONTO MAGNETICAL OBSERVATIONS.

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MARCH, 1856.						APRIL, 1856.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	+0'.30	+.00006	-.00018	-.00017	- 12"	-0.32	-.00025	+.00005	+.00003	+ 15"	
2	...	...	...	...	...	+0.27	- 45	+ 02	- 01	+ 23	
3	+1.67	+ 070	- 03	+ 02	- 37	+0.81	- 38	+ 05	+ 02	+ 21	
4	+0.25	- 007	+ 14	+ 13	+ 10	+1.38	- 99	00	- 06	+ 50	
5	+1.91	- 060	- 07	- 10	+ 27	-0.14	- 31	- 08	- 09	+ 12	
6	-0.51	+ 029	- 10	- 07	- 19	...	...	...	...	...
7	+0.43	- 006	- 13	- 12	- 3	-0.18	- 14	+ 05	+ 04	+ 10	
8	+0.61	+ 046	- 05	- 02	- 26	+0.58	- 21	- 04	- 05	+ 8	
9	...	...	...	...	...	-0.24	+ 06	+ 01	+ 02	- 2	
10	-0.15	+ 082	- 22	- 15	- 53	+0.71	- 04	- 06	- 06	- 1	
11	-0.29	+ 014	- 09	- 08	- 12	-0.12	- 65	- 05	- 09	+ 30	
12	-0.30	+ 052	- 16	- 12	- 34	+0.63	- 86	- 09	- 14	+ 39	
13	-0.06	+ 032	- 03	- 01	- 18	...	...	...	...	...
14	+0.81	+ 043	- 09	- 06	- 26	-0.18	+ 51	- 06	- 03	- 29	
15	-0.19	- 061	- 10	- 13	+ 26	+0.42	- 40	- 03	- 05	+ 19	
16	...	...	...	...	...	-0.72	+ 10	- 05	- 04	- 7	
17	-0.31	- 021	+ 08	+ 06	+ 14	+0.88	+ 50	- 04	00	- 27	
18	-0.99	- 123	+ 07	- 01	+ 65	-1.09	- 17	- 01	- 02	+ 8	
19	-1.33	- 069	+ 12	+ 07	+ 41	+1.15	+ 21	+ 02	+ 03	- 9	
20	-0.22	- 044	- 03	- 06	+ 20	...	...	...	...	...
21	...	...	...	...	...	-0.54	+ 90	- 01	+ 05	- 45	
22	-0.50	+ 021	+ 15	+ 15	- 3	+0.95	- 99	+ 34	+ 26	+ 67	
23	...	...	...	...	...	+0.38	- 61	+ 17	+ 12	+ 40	
24	-0.44	+ 002	+ 06	+ 06	+ 2	-0.73	+ 06	+ 10	+ 10	+ 2	
25	-1.16	+ 086	- 17	- 11	- 52	-0.36	+ 07	+ 11	+ 10	+ 2	
26	+0.09	- 011	+ 04	+ 03	+ 8	-0.65	+ 20	+ 05	+ 06	- 8	
27	+0.21	- 084	+ 26	+ 19	+ 55	...	...	...	...	...
28	+0.17	- 061	- 02	- 06	+ 30	-0.83	+ 05	+ 14	+ 13	+ 5	
29	-0.20	- 036	+ 10	+ 07	+ 23	+1.24	+ 50	- 17	- 13	- 33	
30	...	...	...	...	...	+0.06	+ 08	- 05	- 04	- 7	
31	+0.23	+ 039	+ 05	+ 07	- 17	...	...	...	...	...
Absolute values } 1° 55'. 23 3.50523 13.4562 13.9053 75° 23' 58"						1° 56'. 34 3.50538 13.4496 13.8989 75° 23' 31"					

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MAY, 1856.						JUNE, 1856.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	-0.89	-.00112	-.00010	-.00017	+ 51"	...	...	...	...	...
2	-0.17	- 065	00	- 04	+ 33	+0.05	+.00023	+.00009	+.00010	- 7"
3	-0.28	- 050	- 06	- 09	+ 22	+0.94	+ 14	- 06	- 05	- 10
4	...	...	...	...	...	...	...	...	...	...
5	+0.68	- 021	- 14	- 15	+ 3	+0.34	- 02	+ 03	+ 03	+ 3
6	+0.40	+ 016	- 14	- 12	- 15	+0.12	+ 68	- 02	+ 02	- 35
7	-0.50	- 009	- 01	- 01	+ 4	-0.75	+ 51	+ 07	+ 10	- 22
8	-0.55	+ 035	- 03	00	- 19	...	...	...	...	...
9	-0.25	+ 018	+ 06	+ 07	- 6	-0.04	+ 49	+ 02	+ 05	- 24
10	+1.62	- 008	- 01	- 01	+ 4	+0.80	- 18	- 06	- 07	+ 6
11	...	...	...	...	...	+0.89	- 02	+ 06	+ 06	+ 4
12	-0.04	- 029	- 03	- 04	+ 13	+0.41	- 22	+ 12	+ 10	+ 17
13	-0.47	+ 007	- 03	- 03	- 5	-1.70	- 50	+ 14	+ 10	+ 32
14	-1.84	+ 023	- 10	- 08	- 16	-0.75	- 27	+ 06	+ 04	+ 17
15	+2.05	- 033	+ 12	+ 09	+ 23	...	...	...	...	...
16	-0.18	- 026	- 03	- 04	+ 12	-1.70	+ 31	+ 08	+ 09	- 11
17	+0.01	- 011	+ 11	+ 10	+ 11	+0.01	- 06	- 06	- 06	0
18	...	...	...	...	...	+0.46	- 22	+ 09	+ 07	+ 16
19	+0.37	+ 082	+ 13	+ 18	- 35	-0.45	+ 43	- 04	- 01	- 24
20	+1.66	+ 040	+ 02	+ 04	- 19	+0.46	- 12	- 08	- 09	+ 2
21	+0.15	+ 039	00	+ 02	- 20	+0.88	- 68	- 11	- 15	+ 29
22	+0.92	+ 017	- 11	- 09	- 14	...	...	...	...	...
23	-0.25	- 005	- 05	- 05	0	+1.09	- 12	- 04	- 05	+ 4
24	...	...	...	...	...	-0.55	- 03	- 05	- 05	- 1
25	...	...	...	...	...	-0.19	- 17	+ 13	+ 11	+ 15
26	+0.94	+ 016	- 05	- 02	- 26	-0.40	+ 73	- 25	- 19	- 49
27	-0.64	+ 023	- 08	- 06	- 15	+1.22	+ 23	- 14	- 12	- 19
28	+1.04	+ 022	- 03	- 02	- 13	-0.35	- 15	- 19	- 19	- 2
29	-1.06	- 015	+ 05	+ 04	+ 10	...	...	...	...	...
30	-1.44	+ 013	- 07	- 05	- 10	-0.04	+ 21	- 12	- 09	- 17
31	-0.90	+ 035	- 09	- 06	- 22	...	...	...	...	...
Absolute values }	1° 56'. 12	3.50571	13.4381	13.8878	75° 22' 43"	1° 56'. 09	3.51014	13.4694	13.9193	75° 23' 37"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JULY, 1856.						AUGUST, 1856.				
Day of Month.	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+4.03	-.00004	+.00021	+.00019	+ 12"	-0.61	+.00009	-.00010	-.00009	- 10"
2	-0.97	+ 05	+ 25	+ 23	+ 10	-0.45	+ 104	- 02	+ 04	- 54
3	+0.35	- 28	+ 13	+ 11	+ 21	...	...	...	...	...
4	-0.90	- 15	+ 24	+ 22	+ 20	+0.79	+ 006	- 02	- 01	- 4
5	-1.12	+ 55	+ 09	+ 12	- 23	-0.05	- 016	- 14	- 14	+ 1
6	...	...	...	...	...	-1.25	- 029	- 15	- 16	+ 7
7	+0.92	+ 12	- 05	- 04	- 8	+0.19	+ 029	- 11	- 08	- 20
8	+1.43	+ 62	+ 14	+ 18	- 24	+0.72	- 010	+ 01	0	+ 6
9	+2.27	- 02	- 01	- 01	+ 1	-0.78	- 015	+ 06	+ 5	+ 11
10	+0.66	- 32	+ 08	+ 05	+ 20	...	...	...	...	...
11	+0.22	- 36	- 06	- 08	+ 15	-1.08	- 028	- 13	- 14	+ 8
12	+0.27	- 11	+ 25	+ 22	+ 18	-0.09	- 017	+ 02	+ 01	+ 10
13	...	...	...	...	...	+0.25	+ 012	- 09	- 08	- 11
14	+1.68	- 88	+ 02	- 04	+ 45	0.00	- 019	- 02	- 03	+ 8
15	+0.67	- 08	+ 07	+ 06	+ 8	+0.74	- 004	+ 10	+ 09	+ 7
16	+1.17	+ 12	- 07	- 06	- 10	+0.34	- 045	- 11	- 13	+ 17
17	-0.14	- 12	00	- 01	+ 6	...	...	...	...	...
18	+1.19	- 38	- 10	- 12	+ 14	+0.11	+ 020	00	+ 01	- 10
19	-0.86	+ 11	- 01	00	- 6	+0.97	+ 032	+ 01	+ 03	- 16
20	...	...	...	...	...	-1.14	+ 020	+ 01	+ 02	- 10
21	-0.64	+ 74	+ 04	+ 08	- 36	- 0.59	+ 033	- 01	+ 01	- 17
22	+1.03	+ 41	- 11	- 08	- 26	+2.14	- 247	- 31	- 45	+109
23	-0.52	- 29	- 02	- 04	+ 14	-0.59	- 121	+ 11	+ 02	+ 66
24	+0.22	+ 20	- 06	- 04	- 13	...	...	...	...	...
25	+1.52	- 12	- 12	- 12	0	+0.19	- 033	+ 04	+ 02	+ 19
26	+1.40	- 14	+ 02	+ 01	+ 8	+0.60	- 024	+ 12	+ 10	+ 18
27	...	...	...	...	...	-0.19	- 038	+ 15	+ 12	+ 27
28	-1.17	+ 15	- 12	- 10	- 14	+0.63	- 027	- 02	- 04	+ 12
29	-1.61	- 02	- 12	- 12	- 5	+1.96	- 041	+ 07	+ 03	+ 24
30	+0.63	+ 41	- 07	- 04	- 25	+1.68	+ 017	+ 11	+ 11	- 3
31	+0.11	- 01	- 19	- 18	- 9	...	...	...	...	...
Absolute values }	1° 56'.06	3.51082	13.4806	13.9303	75° 24' 5"	1° 54'.44	3.50705	13.4606	13.9099	75° 23' 48"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

SEPTEMBER, 1856.						OCTOBER, 1856.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+1'.15	-.00063	+.00002	-.00002	+ 32"	-0'.07	-.00023	+.00010	-.00011	+ 7"
2	-0.02	- 29	+ 07	+ 05	+ 18	+0.34	+ 001	+ 01	+ 01	00
3	+1.85	- 31	- 07	- 09	+ 12	-0.37	+ 021	00	+ 02	- 10
4	+0.61	- 89	- 07	- 12	+ 41	-0.89	- 275	+ 54	- 68	+111
5	+1.28	- 04	- 04	- 04	0	...	...	...	...	...
6	+0.07	- 04	- 06	- 06	- 1	-0.87	- 010	- 08	- 08	+ 1
7	...	...	...	...	...	-0.12	- 013	+ 09	+ 08	+ 11
8	+4.87	- 21	- 12	- 13	+ 4	+2.78	- 013	+ 04	+ 03	+ 8
9	+0.48	+ 12	- 12	- 11	- 13	-1.27	- 055	00	- 03	+ 28
10	+0.74	+ 60	- 13	- 09	- 37	+0.37	+ 012	+ 01	+ 01	- 6
11	+0.76	+ 73	- 10	- 05	- 42	+0.75	+ 006	- 06	- 05	- 6
12	+0.48	+ 61	- 09	- 05	- 35	...	...	...	...	...
13	-0.38	+ 24	00	+ 01	- 12	+0.09	000	+ 03	+ 03	+ 2
14	...	...	...	...	...	-0.07	+ 005	+ 01	+ 01	- 2
15	+0.24	+ 49	- 18	- 14	- 34	-0.42	- 004	- 02	- 02	+ 1
16	+1.13	- 18	00	- 01	+ 9	+0.68	- 031	+ 07	+ 04	+ 19
17	-1.79	+ 02	+ 13	+ 13	+ 6	-0.03	+ 018	- 13	- 11	- 16
18	-1.26	+ 17	- 05	- 04	- 11	+0.69	+ 036	+ 07	+ 08	- 15
19	+0.07	+ 40	- 10	- 07	- 25	...	...	...	...	...
20	-0.68	+ 01	+ 14	+ 13	+ 7	-0.60	+ 001	00	00	00
21	...	...	...	...	...	-0.10	+ 011	+ 02	+ 02	- 5
22	-0.67	+ 09	- 10	- 09	- 10	-1.48	- 001	+ 06	+ 06	+ 4
23	-0.54	- 56	+ 09	+ 05	+ 33	-1.75	- 115	- 32	- 37	+ 42
24	-0.06	- 26	+ 08	+ 06	+ 18	-0.14	- 023	- 01	- 02	+ 11
25	+1.74	+ 54	- 01	+ 03	- 27	-0.31	- 035	+ 03	+ 01	+ 10
26	-1.75	- 82	+ 15	+ 09	+ 49	...	...	...	...	...
27	-1.07	- 60	+ 17	+ 13	+ 39	+1.00	+ 027	+ 10	+ 11	- 9
28	...	...	...	...	...	+0.14	+ 007	+ 09	+ 09	+ 1
29	-0.45	+ 03	+ 05	+ 05	+ 1	+0.10	+ 023	- 04	- 02	- 14
30	+3.10	- 61	+ 11	+ 06	+ 36	-0.81	+ 020	+ 07	+ 08	- 7
31	...	...	...	...	...	+0.09	- 022	+ 07	+ 05	+ 15
Absolute values }	1 58'.52	3.50368	13.4639	13.9123	75° 24' 49"	1° 57'.06	3.50392	13.4657	13.9141	75° 24' 52"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

NOVEMBER, 1856.						DECEMBER, 1856.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	+0.72	+0.00018	-0.00025	-0.00023	- 22"	+0.01	-0.00012	+0.00008	+0.00008	- 2"	
2	...	...	...	...	...	+0.48	+ 024	+ 04	+ 05	- 10	
3	-0.54	- 03	- 05	- 05	- 1	+0.08	+ 029	+ 05	+ 07	- 12	
4	+2.18	+ 06	- 08	- 07	- 7	-2.26	+ 065	- 05	- 09	+ 30	
5	+2.51	- 32	- 05	- 07	+ 13	-0.34	- 038	- 04	- 06	+ 17	
6	+0.89	- 26	00	- 03	+ 13	+0.60	+ 025	- 01	+ 01	- 13	
7	-0.97	- 56	- 09	- 12	+ 24	...	...	...	...	...
8	+0.08	+ 55	+ 10	+ 13	- 23	-0.28	- 006	- 01	- 01	+ 3	
9	...	...	...	...	...	+0.32	+ 020	- 05	- 04	- 13	
10	+0.42	- 27	- 01	- 03	+ 13	-0.10	+ 023	- 03	- 01	- 13	
11	-0.19	+ 04	- 06	- 06	- 5	+0.03	+ 042	- 06	- 03	- 24	
12	+0.15	+ 09	- 08	- 07	- 8	+1.11	+ 017	+ 07	+ 08	- 5	
13	+0.68	+ 29	- 05	- 02	- 17	-0.58	- 002	+ 09	+ 08	+ 6	
14	+0.58	+ 33	- 13	- 10	- 23	...	...	...	...	...
15	+0.71	- 07	- 06	- 05	- 7	+0.15	+ 015	+ 02	+ 03	- 6	
16	...	...	...	...	...	-0.01	+ 020	- 02	- 01	- 11	
17	+0.54	- 22	- 01	- 03	+ 10	-0.55	- 014	+ 15	+ 13	+ 15	
18	+0.22	+ 17	+ 12	+ 12	- 3	-0.89	- 067	- 03	- 07	+ 32	
19	-0.55	- 45	- 11	- 13	+ 17	-0.16	- 049	- 28	- 30	+ 11	
20	+0.50	- 52	+ 15	+ 11	+ 34	+0.66	+ 011	- 18	- 16	- 14	
21	-0.76	- 42	+ 15	+ 11	+ 29	...	...	...	...	...
22	-0.32	- 04	+ 11	+ 10	+ 7	+0.08	- 040	- 24	- 25	+ 8	
23	...	...	...	...	...	+0.56	- 049	- 19	- 21	+ 15	
24	-0.65	+ 01	+ 04	+ 04	+ 1	+0.21	- 063	00	- 04	+ 32	
25	-0.24	+ 37	- 07	- 04	- 22	...	...	...	...	...
26	-0.61	+ 74	+ 03	+ 08	- 36	-0.79	- 039	- 19	- 21	+ 10	
27	+0.36	+ 19	+ 10	+ 11	- 4	+0.06	- 007	- 03	- 03	+ 2	
28	-0.79	+ 21	+ 08	+ 08	- 7	...	...	...	...	...
29	-1.62	- 18	+ 05	+ 03	+ 11	+1.35	- 138	- 02	- 11	+ 68	
30	...	...	...	...	...	+0.69	- 096	+ 22	+ 14	+ 59	
31	...	...	...	...	...	-0.19	- 055	+ 14	+ 10	+ 35	
Absolute values	1°58'.31	3.50464	13.4636	13.9123	75° 24' 34"	1°57'.57	3.49593	13.4299	13.8775	75°24'33"	

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JANUARY, 1857.						FEBRUARY, 1857.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0.97	+ .00035	+ .00019	+ .00020	— 8"	...	...	...	...	...
2	+0.63	+ 042	+ 05	+ 08	-- 19	—0.53	— .00023	— .00001	— .00002	+ 11
3	+0.24	+ 032	+ 06	+ 07	— 13	+0.08	— 12	00	— 01	+ 6
4	...	...	...	...	...	+0.88	— 05	+ 03	+ 02	+ 4
5	+0.30	— 001	+ 10	+ 10	+ 6	—0.13	+ 27	+ 06	+ 07	— 11
6	—0.18	+ 030	— 03	00	— 17	+0.19	+ 23	+ 15	+ 16	— 4
7	+0.51	+ 029	+ 01	+ 03	— 14	+0.32	— 27	+ 23	+ 20	+ 25
8	+0.62	+ 007	— 01	— 01	— 4	...	...	...	...	...
9	—0.27	+ 039	— 01	+ 01	— 20	+0.01	— 33	+ 08	+ 06	+ 21
10	+0.69	+ 025	+ 04	+ 06	— 10	—0.73	— 48	+ 06	+ 02	+ 27
11	...	...	...	...	..	+0.15	— 28	+ 10	+ 07	+ 19
12	—0.97	+ 001	— 05	— 05	— 3	—0.28	— 24	— 10	— 11	+ 7
13	+0.07	+ 020	+ 07	+ 08	— 7	—0.38	— 10	+ 06	+ 05	+ 8
14	+0.65	+ 007	+ 10	+ 10	+ 2	—0.14	+ 10	— 02	— 01	— 6
15	+0.14	— 009	— 08	— 08	+ 1	...	...	...	...	...
16	+1.08	— 073	+ 24	+ 18	+ 49	—0.44	+ 06	— 04	— 04	— 5
17	—1.49	— 126	+ 15	+ 06	+ 71	+0.70	— 03	— 06	— 06	— 2
18	...	...	..	...	..	+0.12	+ 16	+ 01	+ 02	— 7
19	—0.61	— 065	— 20	— 23	+ 23	—1.38	— 26	— 09	— 10	+ 8
20	+0.32	— 016	+ 09	+ 07	+ 12	+0.59	+ 23	— 32	— 28	— 28
21	+0.17	— 008	— 06	— 06	+ 1	+0.03	+ 38	— 10	— 07	— 24
22	—0.46	— 022	— 23	— 23	— 1	...	...	...	...	...
23	+0.27	— 005	— 08	— 08	— 1	+0.04	+ 21	— 03	— 02	— 12
24	—0.50	— 014	— 14	— 14	0	—0.42	+ 29	+ 03	+ 05	— 13
25	...	...	...	...	...	+0.71	+ 56	— 02	+ 02	— 29
26	—0.61	— 041	+ 06	+ 03	+ 24	—1.72	+ 04	— 04	— 03	— 4
27	—0.27	— 024	— 06	— 07	+ 9	—0.28	— 26	— 12	— 13	+ 7
28	+0.04	+ 006	— 04	— 04	— 5	+0.66	— 24	— 04	— 05	+ 10
29	—0.40	— 007	+ 10	+ 09	+ 9	...	...	...	...	...
30	—0.89	— 011	— 01	— 02	+ 5	...	...	...	...	...
31	—0.07	+ 030	— 20	— 17	— 25	...	...	...	...	...
Absolute values }	1° 58'. 54	3.48683	13.3901	13.8367	75° 24' 15"	1° 59'. 79	3.47278	13.3295	13.7745	75° 23' 50"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MARCH, 1857.						APRIL, 1857.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	...	...	...	...	..	-1.09	-.00029	-.00005	-.00007	+ 12"
2	-0.27	+.00008	+.00001	+.00002	- 3"	+0.63	+ 08	- 33	- 30	- 20
3	+0.93	+ 021	+ 04	+ 05	- 8	+0.71	- 25	- 03	- 05	+ 11
4	+0.84	+ 043	+ 06	+ 08	- 19	+0.44	- 30	- 04	- 06	+ 13
5	-0.10	+ 061	+ 15	+ 18	- 23	...	...	...	...	...
6	+0.19	+ 017	+ 18	+ 18	+ 1	+1.28	- 15	+ 10	+ 09	+ 13
7	+0.75	- 031	+ 07	+ 05	+ 19	-0.19	- 26	+ 07	+ 05	+ 17
8	...	...	...	...	...	+0.76	+ 11	+ 06	+ 07	- 2
9	-0.04	+ 001	00	00	- 1	+0.35	+ 27	+ 07	+ 08	- 10
10	+1.07	- 015	- 13	- 13	+ 1	...	...	..	...	...
11	+0.25	- 027	- 04	- 06	+ 11	-0.42	- 53	+ 01	- 02	+ 27
12	+1.09	- 019	+ 07	+ 05	+ 13	...	...	...	...	...
13	-0.17	- 045	- 02	- 04	+ 22	-0.76	- 35	- 10	- 10	+ 13
14	-1.00	- 003	+ 04	+ 03	+ 3	-0.62	- 74	- 02	- 07	+ 36
15	...	...	...	...	...	+1.43	- 29	+ 02	00	+ 16
16	+0.66	- 024	+ 09	+ 07	+ 17	+0.66	+ 05	+ 06	+ 06	+ 1
17	-1.41	- 048	+ 53	+ 47	+ 51	-0.30	- 13	- 03	- 04	+ 5
18	+1.06	- 147	+ 39	+ 27	+ 94	+0.42	+ 18	+ 01	+ 02	- 9
19	-0.26	- 045	+ 14	+ 10	+ 30	...	...	...	...	...
20	-0.35	- 054	+ 22	+ 17	+ 39	-0.50	+ 11	- 05	- 04	- 8
21	+0.15	+ 020	+ 16	+ 16	- 2	-1.30	+ 35	+ 13	+ 15	- 11
22	...	...	...	...	...	+0.13	+ 12	- 02	- 01	- 7
23	-0.63	+ 013	+ 12	+ 12	- 1	-0.55	+ 07	- 10	- 09	- 9
24	-0.69	+ 014	+ 08	+ 08	- 3	-1.42	+ 29	- 04	- 02	- 16
25	-0.81	+ 026	+ 01	+ 03	- 12	-0.86	+ 08	- 13	- 12	- 11
26	-0.53	+ 036	- 01	+ 01	- 18	...	...	..	...	...
27	+0.16	+ 008	- 04	- 03	- 6	-0.60	+ 14	+ 25	+ 25	+ 6
28	-0.42	- 048	- 08	- 10	+ 20	-0.19	+ 22	00	+ 01	- 11
29	...	...	...	...	...	-0.01	+ 06	- 08	+ 08	+ 1
30	+0.03	+ 005	- 02	- 02	- 4	-0.16	- 09	+ 10	- 10	- 1
31	-0.53	- 018	- 06	- 07	+ 6	...	...	...	...	...
Absolute values }	2°00'.61	3.51135	13.4878	13.9373	75°24'28"	1°59'.69	3.47608	13.3605	13.8053	75°24'59"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MAY, 1857.						JUNE, 1857.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	-0.19	+0.00016	-0.00005	-0.00003	- 10"	+1.03	-0.00026	+0.00007	+0.00005	+ 17"
2	+0.17	+ 059	- 003	+ 001	- 31	-0.09	- 34	+ 15	+ 12	+ 25
3	...	...	...	...	...	+0.06	- 05	- 04	- 04	+ 1
4	+0.39	+ 054	- 006	- 002	- 30	-0.05	00	+ 07	+ 07	+ 4
5	-0.33	+ 090	- 017	- 011	- 54	-0.63	- 27	+ 13	+ 11	+ 21
6	-0.32	+ 066	+ 002	+ 006	- 32	-0.41	- 21	+ 22	+ 19	+ 22
7	+3.64	- 545	- 195	- 217	+ 176	...	...	...	...	...
8	+0.17	- 180	+ 007	- 005	+ 94	-0.12	+ 26	- 01	+ 01	- 14
9	+0.07	- 051	+ 024	+ 019	+ 38	-0.89	+ 28	+ 13	+ 14	- 8
10	...	...	...	...	...	+0.20	- 15	+ 11	+ 09	+ 13
11	+0.03	- 113	+ 008	000	+ 61	+0.03	+ 38	+ 07	+ 09	- 15
12	-0.53	- 126	+ 025	+ 016	+ 76	-0.53	- 17	- 26	- 25	- 4
13	+0.21	- 121	+ 016	+ 008	+ 69	+0.26	+ 12	+ 10	+ 10	- 1
14	+0.17	- 088	+ 020	+ 014	+ 54	...	...	...	...	...
15	+0.04	- 066	+ 002	- 002	+ 34	-0.30	- 19	- 03	- 04	+ 8
16	-0.51	+ 012	+ 002	+ 003	- 5	+0.17	+ 06	- 02	- 02	- 4
17	...	...	...	...	...	+1.18	- 23	- 10	- 11	+ 7
18	+0.80	+ 049	- 003	000	- 26	-0.16	+ 30	- 12	- 09	- 21
19	+0.68	+ 035	- 002	000	- 19	-0.10	+ 01	- 13	- 12	- 7
20	+0.96	+ 017	- 002	- 001	- 9	-0.24	+ 20	- 03	- 01	- 12
21	+1.46	- 017	+ 005	+ 003	+ 11	...	...	...	...	...
22	+0.48	- 013	+ 004	+ 003	+ 8	+0.62	+ 09	+ 04	+ 04	- 3
23	-1.23	+ 004	- 014	- 003	- 9	+0.23	+ 18	- 02	00	- 10
24	...	...	...	...	...	+0.31	+ 26	- 11	- 09	- 19
25	+0.08	- 040	- 001	- 004	+ 20	+0.10	+ 51	- 02	+ 01	- 27
26	+0.63	- 018	- 016	- 016	+ 1	-0.48	+ 27	- 13	- 10	- 20
27	-0.62	+ 010	- 009	- 008	- 9	-0.57	- 06	- 06	- 06	0
28	-0.45	- 026	- 010	- 011	+ 8	...	...	...	...	...
29	+0.03	+ 030	+ 001	- 003	- 15	-0.33	- 19	- 12	- 12	+ 3
30	-0.68	- 016	- 016	- 016	0	+0.60	- 12	- 30	- 28	- 9
31	...	...	...	...	...	...	...	...	...	...
Absolute values	1°58'.85	3.49014	13.3978	13.8450	75° 23' 56"	1°58'.89	3.50253	13.4448	13.8935	75°23'54"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JULY, 1857.						AUGUST, 1857.				
Day of Month.	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0'.40	+ .00032	-.00005	-.00001	- 28"	+0'.76	+ .00052	.00000	+ .00003	- 26"
2	-1.25	+ 005	+ 06	+ 06	0	...	...	...	...	...
3	-1.02	- 018	- 02	- 03	+ 8	-0.06	+ 18	- 02	- 01	- 10
4	+0.03	+ 014	+ 05	+ 06	- 4	+0.95	- 04	+ 04	+ 04	+ 4
5	...	...	...	...	...	-0.07	+ 35	- 06	- 03	- 21
6	+0.20	+ 049	+ 04	+ 06	- 23	+0.84	+ 57	+ 06	+ 09	- 26
7	-1.09	+ 104	- 06	+ 01	- 55	+0.69	+ 13	- 03	- 02	- 8
8	+2.94	+ 001	- 13	- 12	- 7	-0.19	- 25	+ 03	+ 01	+ 14
9	-0.73	- 021	+ 04	+ 02	+ 12	...	...	...	...	...
10	+0.17	- 036	- 05	- 07	+ 16	+0.01	+ 32	- 04	- 02	- 18
11	-1.04	- 013	+ 33	+ 30	+ 23	+0.41	+ 27	- 16	- 13	- 22
12	...	...	...	...	...	+2.62	+ 43	- 21	- 17	- 33
13	+0.31	- 060	+ 03	- 01	+ 32	-1.54	- 21	- 16	- 16	+ 3
14	-1.30	- 071	- 18	- 22	+ 26	+0.48	+ 33	+ 03	+ 05	- 15
15	-0.19	- 002	+ 13	+ 12	+ 7	-0.33	+ 28	- 04	- 02	- 16
16	+0.33	+ 011	- 14	- 12	- 13	...	...	...	...	...
17	-0.51	+ 035	+ 07	+ 09	- 14	-1.18	+ 27	00	+ 01	- 14
18	-0.09	+ 020	- 11	- 09	- 15	+0.09	+ 26	+ 13	+ 14	- 6
19	...	...	...	...	...	-1.39	- 05	- 03	- 03	+ 1
20	-0.63	- 003	- 33	- 31	- 15	-0.13	- 10	- 21	- 21	- 6
21	-0.16	- 013	+ 02	+ 01	+ 7	-0.74	- 18	+ 06	+ 05	+ 12
22	+2.35	- 018	- 12	- 12	+ 3	+0.39	- 22	+ 01	00	+ 12
23	+0.82	- 014	+ 03	+ 02	+ 8	...	...	...	...	...
24	+1.64	- 034	+ 02	- 01	+ 18	+0.30	+ 21	+ 05	+ 06	- 8
25	-0.08	- 088	- 01	- 07	+ 44	-0.28	- 07	00	- 01	+ 3
26	...	...	...	...	...	+0.71	- 15	+ 08	+ 07	+ 11
27	+0.53	+ 048	+ 09	+ 11	- 20	+0.15	+ 10	+ 08	+ 08	- 1
28	+0.35	+ 085	+ 05	+ 11	- 40	-0.03	- 03	+ 13	+ 12	+ 8
29	-0.09	- 043	- 06	- 08	+ 19	+0.15	+ 32	- 01	+ 01	- 16
30	-0.08	- 005	+ 04	+ 03	+ 4	...	...	...	...	...
31	+0.27	- 012	+ 04	+ 03	+ 8	+1.05	- 43	- 03	- 05	+ 20
Absolute values	1° 59'.85	3.50025	13.4365	13.8847	75° 23' 55"	2° 01'.86	3.50024	13.4365	13.8850	75° 23' 56"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

SEPTEMBER, 1857.						OCTOBER, 1857.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	+2.40	+ .00047	-.00030	-.00025	- 39"	+1.54	-.00009	-.00010	-.00009	- 1"	
2	+1.69	+ 066	- 13	- 008	- 40	+0.84	- 052	+ 08	+ 04	+ 31	
3	+1.57	- 460	- 90	- 114	+ 186	+0.08	+ 021	+ 12	+ 13	+ 4	
4	-0.10	- 135	- 03	- 011	+ 67	...	...	...	...	...
5	+0.92	- 074	- 04	- 008	+ 36	+0.05	- 018	00	- 01	+ 9	
6	...	...	...	...	...	-0.58	+ 016	- 06	- 05	- 11	
7	+1.32	- 051	+ 18	+ 014	+ 35	-1.18	- 037	- 16	- 18	+ 10	
8	+0.74	- 061	+ 04	000	+ 33	-1.28	- 057	- 02	- 06	+ 28	
9	+1.46	- 082	+ 01	- 005	+ 42	-1.21	+ 029	+ 01	+ 03	- 14	
10	-0.37	- 123	- 35	- 041	+ 44	-1.10	+ 060	- 02	+ 02	- 31	
11	-0.42	- 016	- 19	- 019	- 2	...	...	...	...	...
12	+0.54	- 009	+ 07	+ 006	+ 8	-2.06	- 004	00	- 01	+ 2	
13	...	...	...	...	...	-0.27	+ 065	- 08	- 03	- 36	
14	-1.54	+ 037	- 08	- 006	- 23	-0.73	+ 049	- 09	- 06	- 29	
15	-0.53	- 022	+ 14	+ 012	+ 18	-0.53	+ 031	- 09	- 07	- 20	
16	-0.50	+ 009	- 02	- 001	- 5	-0.26	+ 039	- 14	- 10	- 26	
17	0.00	+ 035	+ 02	+ 004	- 17	+3.83	- 099	- 12	- 17	+ 44	
18	-2.32	- 020	- 25	- 025	- 3	...	...	...	...	...
19	0.00	+ 027	+ 18	+ 019	- 4	+1.20	- 045	+ 01	- 02	+ 23	
20	...	...	...	...	...	-0.13	- 010	- 02	- 03	+ 4	
21	-2.08	- 038	- 13	- 014	+ 13	+0.27	- 035	+ 05	+ 02	+ 20	
22	-0.91	- 084	+ 09	+ 003	+ 47	+0.88	- 002	+ 01	+ 01	+ 2	
23	+3.44	- 104	+ 09	+ 002	+ 57	+2.17	- 043	+ 01	- 02	+ 23	
24	+0.40	+ 021	+ 12	+ 012	- 5	+1.18	- 121	+ 21	+ 12	+ 72	
25	-0.55	+ 040	+ 02	+ 004	- 19	...	...	...	...	...
26	-0.21	+ 051	- 05	- 001	- 28	+0.50	- 017	+ 01	00	+ 9	
27	...	...	...	...	...	+0.80	+ 004	- 02	- 02	- 3	
28	+0.53	+ 066	+ 14	+ 018	- 26	+0.73	+ 019	- 03	- 01	- 11	
29	-0.93	+ 022	+ 09	+ 010	- 6	+0.34	- 008	+ 11	+ 06	+ 46	
30	-0.66	+ 001	+ 11	+ 011	+ 5	-1.61	- 083	- 04	- 09	+ 40	
31	...	...	...	...	...	+0.30	- 032	+ 10	+ 07	+ 21	
Absolute values } 2° 01' 58" 3.48263 13.3878 13.8334 75° 25' 7"						2° 01' 69" 3.48230 13.3850 13.8305 75° 25' 1"					

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

NOVEMBER, 1857.						DECEMBER, 1857.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	...	...	...	...	...	0.00	+ .00017	+ .00002	+ .00003	— 7"	
2	+1.54	+ .00102	— .00003	+ .00004	— 53"	+ 1.26	— 0017	+ 01	000	+ 9	
3	—1.17	+ 049	— 12	— 08	— 31	+ 0.13	— 0002	— 09	— 008	— 3	
4	—0.28	— 014	+ 05	+ 04	+ 9	+ 0.37	+ 0056	— 05	— 001	— 31	
5	+0.10	+ 004	+ 34	+ 32	+ 15	+ 0.63	+ 0023	— 05	— 004	— 14	
6	+0.32	+ 012	+ 01	+ 01	— 6	...	...	...	...	...
7	—0.37	— 003	— 05	— 04	— 1	+ 0.70	+ 0048	— 11	— 007	— 30	
8	...	...	...	...	...	+ 0.31	+ 0044	— 10	— 006	— 27	
9	—1.87	+ 066	+ 27	+ 21	+ 47	+ 0.24	+ 0086	— 11	— 005	— 49	
10	—0.15	— 089	— 02	— 04	+ 44	+ 0.27	+ 0036	— 02	+ 001	— 19	
11	—0.45	+ 005	+ 11	+ 11	+ 3	+ 0.23	+ 0004	— 08	— 007	— 6	
12	+0.42	— 054	+ 01	— 03	+ 28	— 1.07	— 0006	+ 04	+ 003	+ 5	
13	+0.01	— 007	+ 05	+ 04	+ 6	...	...	...	...	...
14	—0.04	+ 016	+ 04	+ 05	— 6	+ 0.63	+ 0027	— 07	— 005	— 17	
15	...	...	...	...	...	— 0.20	+ 0046	— 08	— 005	— 27	
16	+2.62	— 058	— 01	— 04	+ 29	+ 3.11	+ 0343	— 09	+ 014	—177	
17	+1.10	— 285	— 33	— 49	+ 127	—13.48	— 1453	— 36	— 126	+713	
18	—2.93	— 124	— 24	— 31	+ 50	— 0.66	— 0207	+ 35	+ 019	+121	
19	—0.30	+ 026	+ 08	+ 09	— 9	— 0.85	— 0203	+ 49	+ 033	+127	
20	—0.27	+ 018	— 03	— 02	— 10	...	...	...	...	...
21	—0.03	+ 005	— 14	— 13	— 10	— 0.18	— 0120	+ 10	+ 002	+ 65	
22	...	...	...	...	...	— 0.12	— 0097	+ 06	000	+ 52	
23	+1.79	— 086	— 29	— 33	+ 28	+ 0.53	— 0170	+ 01	— 010	+ 86	
24	—2.13	— 063	— 09	— 12	+ 27	— 0.19	— 0107	+ 07	000	+ 57	
25	+1.29	— 016	— 16	— 16	0	...	...	...	...	...
26	+2.29	— 027	— 44	— 43	— 9	— 0.25	— 0039	— 01	— 004	+ 19	
27	—0.81	+ 008	— 27	— 25	— 18	...	...	...	...	...
28	+0.09	+ 054	— 27	— 29	+ 13	— 2.11	— 0120	— 29	— 035	+ 45	
29	...	...	...	...	...	+ 0.09	— 0058	— 12	+ 007	+ 35	
30	+0.88	+ 084	— 29	— 22	— 57	+ 0.25	— 0004	+ 09	+ 008	+ 7	
31	...	...	...	...	...	0.00	+ 0054	+ 03	+ 006	— 26	
Absolute values	...	3.47622	13.8523	13.7974	75° 24' 26"	2° 03' 67	3.47831	13.3550	13.8005	75° 24' 6"	

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JANUARY, 1858.						FEBRUARY, 1858.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0.97	+ .00060	+ .00008	+ .00012	- 26"	+0.98	+ .00081	- .00014	- .00008	- 48"
2	+1.17	- 011	- 02	- 02	+ 5	+0.55	- 052	+ 17	+ 18	+ 35
3	...	...	...	...	...	+0.75	- 023	+ 05	+ 04	+ 14
4	+2.23	- 024	+ 03	+ 01	+ 14	+0.46	+ 003	+ 16	+ 15	+ 7
5	+1.17	+ 050	- 09	- 06	- 30	+0.23	- 052	+ 05	+ 02	+ 29
6	+0.59	+ 027	- 12	- 10	- 20	+0.86	- 018	+ 05	+ 04	+ 12
7	-0.11	- 011	- 03	- 04	+ 4	...	...	...	...	...
8	+1.67	- 061	+ 40	+ 34	+ 51	-0.51	+ 003	+ 18	+ 17	+ 8
9	-4.63	- 311	+ 06	- 14	+ 160	-1.09	+ 025	+ 07	+ 08	- 9
10	...	...	...	...	...	+0.87	+ 045	+ 06	+ 09	- 20
11	-0.27	- 134	+ 01	- 07	+ 68	-0.71	+ 048	+ 05	+ 08	- 22
12	-0.37	- 123	+ 07	- 01	+ 66	+0.64	+ 046	+ 01	+ 04	- 22
13	-1.46	- 143	+ 13	+ 03	+ 78	-1.79	- 006	+ 08	+ 16	+ 12
14	+0.17	- 047	+ 02	- 01	+ 25	...	...	...	...	...
15	-0.17	- 003	+ 05	+ 05	+ 4	+1.25	- 144	+ 12	+ 02	+ 78
16	+0.83	+ 029	- 05	- 03	- 17	+0.76	- 194	- 12	- 23	+ 91
17	...	...	...	...	...	+0.01	- 113	+ 43	+ 33	+ 78
18	+0.25	- 068	- 18	- 21	+ 25	+0.33	- 039	+ 10	+ 07	+ 25
19	-0.99	- 026	+ 01	- 01	+ 13	+0.15	- 056	- 03	- 07	+ 26
20	-0.48	- 028	+ 05	+ 03	+ 17	-0.53	- 071	- 08	- 12	+ 32
21	-1.04	- 008	+ 13	+ 12	+ 11	...	...	...	...	...
22	+0.04	+ 002	+ 07	+ 07	+ 2	+0.91	+ 008	+ 07	+ 07	0
23	-1.07	+ 026	+ 02	+ 03	- 12	-0.32	+ 022	- 08	- 06	- 15
24	...	...	...	...	...	+0.37	- 010	- 07	- 08	+ 1
25	-0.79	+ 020	+ 02	+ 03	- 9	+0.91	+ 024	- 06	- 04	- 15
26	+0.29	+ 007	+ 06	+ 06	- 1	+0.14	+ 041	- 14	- 10	- 28
27	+0.42	+ 033	- 03	- 01	- 18	-0.22	+ 002	- 21	- 19	- 12
28	-0.99	+ 039	- 12	- 09	- 26	...	...	...	...	...
29	-0.35	+ 073	- 04	+ 01	- 39	...	...	...	...	...
30	-0.41	+ 031	- 20	- 17	- 26	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
Absolute values }	2° 02' 82"	3.47792	13.3615	13.8068	75° 24' 36"	2° 03' 78"	3.47478	13.3813	13.8252	75° 26' 36"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MARCH, 1858.						APRIL, 1857.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0'.68	-.00045	+.00007	+.00003	+ 26"	+1'.17	-.00067	-.00011	-.00015	+ 28"
2	+3.60	— 117	— 29	— 35	+ 44	...	...	...	...	...
3	-1.10	+ 014	— 27	— 24	— 21	-0.63	— 008	+ 12	+ 11	+ 11
4	-0.56	— 048	— 10	— 13	+ 19	...	...	...	...	...
5	-1.64	— 060	— 01	— 04	+ 30	-0.51	— 010	+ 06	+ 05	+ 8
6	-0.11	— 043	— 11	— 13	+ 16	-1.05	+ 012	— 02	— 01	— 7
7	...	...	...	...	...	-0.42	+ 043	— 05	— 02	— 24
8	+0.14	+ 014	— 14	— 12	— 14	+2.27	— 008	+ 11	+ 09	+ 9
9	+0.89	— 019	— 12	— 13	+ 3	-4.46	+ 007	+ 52	+ 49	+ 22
10	+0.24	+ 023	— 04	— 02	— 14	-0.66	— 365	+ 45	+ 19	+206
11	-0.19	+ 056	— 23	— 18	— 40	...	...	...	...	...
12	+6.08	— 201	— 18	— 30	+ 92	+0.28	— 155	+ 05	— 06	+ 80
13	+2.59	— 147	+ 62	+ 49	+ 106	+1.72	— 125	+ 25	+ 16	+ 76
14	...	...	...	...	...	+0.57	— 091	+ 26	+ 19	+ 59
15	+2.03	— 160	+ 27	+ 15	+ 94	+0.65	— 139	+ 03	— 06	+ 72
16	+0.24	— 162	+ 29	+ 17	+ 96	-1.38	— 065	+ 16	+ 11	— 41
17	-1.79	— 041	+ 25	+ 21	+ 34	-0.89	000	— 24	— 23	— 12
18	+0.86	— 073	+ 25	+ 18	+ 49	...	...	...	...	...
19	-0.61	— 046	+ 04	+ 01	+ 25	+0.18	— 005	+ 06	+ 06	+ 6
20	-0.83	— 036	+ 03	— 05	+ 16	+1.02	+ 085	+ 08	+ 13	— 39
21	...	...	...	...	...	+1.89	— 054	+ 08	+ 04	+ 31
22	-0.81	— 001	+ 05	+ 05	+ 3	-0.27	+ 019	+ 06	+ 07	— 7
23	+1.18	+ 060	— 20	— 15	— 40	+1.18	+ 029	— 21	— 18	— 25
24	+0.36	+ 050	— 19	— 14	— 34	+0.32	+ 081	— 12	— 06	— 46
25	+1.54	+ 003	— 14	— 13	— 8	...	...	...	...	...
26	+0.25	+ 050	— 07	— 03	— 29	-0.24	+ 043	— 16	— 12	— 30
27	+0.39	+ 063	+ 14	+ 17	— 25	+0.75	+ 127	— 20	— 10	— 74
28	...	...	...	...	...	+0.50	+ 010	— 14	— 12	— 12
29	+0.57	— 196	+ 86	+ 68	+ 142	-0.15	+ 016	+ 01	+ 02	— 7
30	-0.76	— 100	+ 56	+ 46	+ 78	-0.83	— 011	— 08	— 08	+ 2
31	+4.57	— 063	+ 72	+ 63	+ 68	...	...	...	...	...
Absolute values }	2° 04'.44	3.47249	13.3664	13.8101	75° 26' 13"	2° 04'.03	3.48696	13.3821	13.8290	75° 23' 43"

TABLE XL^{Y''}~~XX~~.

ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MAY, 1858.						JUNE, 1858.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	+0'.02	+0.00013	+0.00007	+0.00008	— 3"	+0'.23	+0.00125	—0.00006	+0.00002	— 66"	
2	...	...	...	...	...	+0.22	+ 054	+ 01	+ 04	— 27	
3	+0.19	+ 058	— 04	00	— 31	+0.04	— 042	— 30	+ 31	+ 6	
4	+0.07	+ 019	— 07	— 05	— 18	+1.56	— 031	+ 30	— 26	+ 31	
5	—0.55	+ 033	— 05	— 02	— 19	+1.61	— 032	+ 23	+ 20	+ 28	
6	+0.07	+ 052	— 03	00	— 28	...	...	...	...	...
7	+2.72	— 019	— 22	— 22	— 1	—0.04	— 075	— 04	— 08	+ 36	
8	+2.77	— 177	— 12	— 22	+ 83	+0.22	— 003	+ 27	+ 25	+ 15	
9	...	...	...	...	...	+0.35	— 010	+ 48	+ 45	+ 29	
10	+2.00	— 169	— 06	— 16	+ 83	—0.85	+ 062	+ 24	+ 26	— 19	
11	+1.20	— 113	— 01	— 08	+ 56	—0.71	— 062	+ 25	+ 24	+ 14	
12	+0.63	— 037	— 03	— 05	+ 17	+1.29	+ 017	+ 26	+ 26	+ 4	
13	—0.94	— 058	+ 06	+ 02	+ 32	...	...	...	...	...
14	+0.02	— 033	+ 03	+ 01	+ 18	+0.59	+ 008	— 01	— 01	— 5	
15	—0.43	— 049	— 02	— 05	+ 24	—0.53	+ 002	+ 08	+ 08	+ 3	
16	...	...	...	...	...	—0.43	+ 070	+ 03	+ 07	— 34	
17	—0.88	— 012	+ 13	+ 12	+ 12	+1.69	+ 022	+ 21	+ 21	— 1	
18	—0.63	— 023	— 06	— 07	+ 9	+1.11	+ 031	— 09	— 06	— 20	
19	—0.52	— 028	+ 04	+ 02	+ 16	+1.79	— 019	+ 01	00	+ 10	
20	—0.59	+ 071	— 02	+ 03	— 37	...	...	...	...	...
21	+3.06	+ 129	— 15	— 06	— 73	—0.04	— 003	— 16	— 15	— 6	
22	+0.25	+ 060	— 16	— 12	— 39	+0.63	+ 112	+ 11	+ 18	— 51	
23	...	...	...	...	...	+1.99	— 208	— 35	— 46	+ 87	
24	+1.25	— 043	— 24	— 26	+ 9	+4.44	— 226	— 09	— 22	+109	
25	+0.02	— 002	— 02	— 02	0	—1.50	— 188	— 19	— 30	+ 85	
26	—0.05	+ 048	— 04	— 01	— 26	—0.08	— 176	+ 07	— 05	+ 92	
27	—0.36	+ 036	— 06	— 03	— 21	...	...	...	...	...
28	+0.06	— 020	+ 06	+ 04	+ 13	+0.08	— 106	+ 02	— 05	+ 55	
29	—0.27	+ 002	— 10	— 09	— 6	+1.00	— 164	+ 07	— 04	+ 86	
30	...	...	...	...	...	—1.40	— 182	— 12	— 23	+ 86	
31	+0.91	+ 082	— 08	— 02	— 45	...	...	...	...	...
Absolute values { 2° 03'.72 3.50101 13.4384 13.8870 75° 23' 52" 2° 03'.54 3.49898 13.4144 13.8632 75° 22' 51"											

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JULY, 1858.						AUGUST, 1858.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	-0.54	-.00122	-.00010	-.00018	+ 56"	...	...	...	...	...
2	-0.54	-.027	+ 36	+ 32	+ 32	-0.09	-.00069	-.00003	-.00007	+ 33"
3	+0.47	-.179	+ 32	+ 19	+ 106	-0.22	+ 066	-.05	00	- 36
4	...	...	...	...	...	+0.19	-.054	-.05	08	+ 25
5	+1.61	-.018	+ 42	+ 38	+ 30	+0.73	-.031	-.02	04	+ 15
6	-1.58	-.148	+ 03	-.06	+ 76	+0.66	-.045	-.15	17	+ 15
7	-0.99	-.137	+ 12	+ 03	+ 75	-1.22	+ 001	-.17	16	- 9
8	-2.07	-.054	-.09	-.12	+ 23	...	...	...	...	...
9	+1.03	-.088	-.01	-.07	+ 44	+0.07	+ 044	-.05	02	- 25
10	-0.14	-.094	+ 01	-.05	+ 48	-0.33	-.043	+ 10	+ 07	+ 27
11	...	...	...	...	...	-0.47	-.002	-.06	06	- 2
12	-0.36	+ 032	+ 10	+ 11	- 11	-0.04	-.051	-.20	22	+ 16
13	-1.63	+ 045	-.07	-.04	- 26	-0.22	+ 105	-.08	01	- 57
14	+0.14	+ 017	+ 01	+ 02	- 8	+0.55	+ 030	+ 04	+ 05	- 13
15	-0.41	-.082	00	-.05	+ 42	...	...	...	...	...
16	-0.81	-.017	-.10	-.10	+ 4	+0.32	-.074	+ 14	+ 09	+ 44
17	-0.27	-.042	-.08	-.11	+ 17	-0.60	-.020	00	-.01	+ 10
18	...	...	...	...	...	-0.11	-.016	+ 02	+ 01	+ 9
19	+0.22	+ 064	-.07	-.03	- 36	-0.19	-.025	00	-.02	+ 12
20	+0.29	+ 030	-.04	-.02	- 17	-0.19	+ 063	+ 15	+ 18	- 24
21	-0.03	+ 044	-.07	-.04	- 26	-0.37	-.023	-.09	10	+ 7
22	-0.84	+ 068	+ 01	+ 05	- 34	...	...	...	...	...
23	-1.08	+ 050	-.12	-.08	- 31	-1.09	+ 037	+ 15	+ 17	- 11
24	-0.30	+ 086	-.04	+ 02	- 46	+0.95	+ 090	+ 09	+ 14	- 41
25	...	...	...	...	...	+1.30	-.001	+ 02	+ 02	+ 1
26	+2.65	+ 012	-.07	-.06	- 10	+0.93	+ 011	+ 20	+ 20	+ 5
27	+4.68	-.061	-.06	-.09	+ 28	-0.13	-.032	+ 29	+ 25	+ 31
28	+4.02	+ 001	+ 09	+ 08	+ 4	+0.27	-.070	+ 10	+ 05	+ 40
29	+2.28	-.100	-.05	-.11	+ 48	...	...	...	...	...
30	+3.02	-.061	+ 16	+ 11	+ 38	+1.94	-.022	+ 18	+ 15	+ 20
31	+1.63	-.006	-.10	-.10	- 2	-1.76	+ 011	00	+ 01	- 5
Absolute values }	2° 04' 33"	3.50144	13.4302	13.8792	75° 23' 15"	2° 06' 34"	3.50049	13.4343	13.8829	75° 23' 44"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

SEPTEMBER, 1858.						OCTOBER, 1858.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0'.72	-.00054	-.00002	-.00005	+ 26"	-0'.63	+ .00043	-.00008	-.00005	- 26"
2	+1.62	- 063	+ 14	+ 09	+ 39	+0.05	- 092	- 24	- 28	+ 34
3	+1.39	- 021	00	- 01	+ 11	...	...	...	...	...
4	+1.28	- 007	- 12	- 11	- 8	+2.34	- 062	- 18	- 16	+ 25
5	...	...	...	...	...	+0.04	- 013	- 20	- 20	- 8
6	-0.49	+ 001	- 05	- 05	- 8	+0.02	- 008	- 16	- 15	- 4
7	+2.61	- 054	+ 06	+ 02	+ 30	-1.37	- 016	- 20	- 17	- 18
8	+2.71	- 161	- 28	- 36	+ 67	+3.62	- 101	+ 13	+ 05	+ 57
9	+0.18	- 172	- 10	- 20	+ 81	+1.35	- 078	+ 03	- 02	+ 41
10	-0.04	- 054	- 02	- 06	+ 26	...	...	...	...	...
11	-3.13	- 094	+ 11	+ 04	+ 53	+0.11	+ 033	+ 04	+ 06	- 15
12	...	...	...	...	...	-0.27	+ 059	- 03	+ 01	- 31
13	+1.42	- 037	+ 09	+ 06	+ 23	-0.13	+ 027	+ 05	+ 07	- 11
14	+1.50	+ 070	+ 05	+ 10	- 33	+0.04	+ 076	+ 05	+ 09	- 36
15	-0.65	- 029	- 03	- 04	+ 13	-0.23	+ 118	- 07	+ 01	- 63
16	+0.24	+ 008	- 02	- 02	- 5	-0.20	+ 116	- 01	+ 07	- 58
17	+0.19	+ 055	+ 04	+ 07	- 26	...	...	...	...	...
18	+0.54	+ 083	+ 04	+ 09	- 40	+1.37	- 006	+ 16	+ 15	+ 11
19	...	...	...	...	...	-0.78	- 113	+ 26	+ 17	+ 70
20	+0.56	- 284	+ 41	+ 20	+ 164	-0.81	- 029	+ 26	+ 23	+ 28
21	+2.34	- 185	+ 09	- 03	+ 98	+0.74	- 097	- 02	- 08	+ 48
22	-0.04	- 097	+ 11	+ 04	+ 54	-0.27	- 012	+ 07	+ 05	+ 10
23	+2.12	- 003	- 02	- 02	+ 1	-0.54	+ 016	+ 15	+ 15	0
24	+0.45	- 098	- 22	- 27	+ 38	...	...	...	...	...
25	-0.49	+ 032	- 05	- 04	- 19	-0.52	+ 069	+ 04	+ 08	- 33
26	...	...	...	...	...	+0.77	- 004	- 01	- 01	+ 2
27	-0.81	+ 040	- 02	+ 01	- 21	+2.16	- 509	- 50	- 80	+ 231
28	-0.16	+ 061	- 03	+ 02	- 32	-0.38	- 198	+ 33	+ 18	+ 116
29	+0.16	+ 055	- 06	- 02	- 31	+3.47	- 217	+ 02	- 12	+ 111
30	-0.61	+ 051	- 08	- 04	- 29	+0.01	- 110	- 03	- 09	+ 54
31	...	...	...	...	...	...	...	...	...	...
Absolute values }	2° 05'.36	3.49515	13.4352	13.8824	75° 25' 4"	2° 05'.27	3.49414	13.4222	13.8696	75° 24' 30"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

NOVEMBER, 1858.						DECEMBER, 1858.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0'.01	-.00155	+.00026	+.00014	+ 91"	+ 0'.19	+.00025	.00000	+.00002	- 12"
2	+0.19	- 048	- 05	- 08	+ 21	+ 0.77	+ 036	+ 08	+ 09	- 14
3	-0.61	- 054	- 10	- 13	+ 22	+ 0.45	+ 015	+ 03	+ 03	- 6
4	+0.50	- 034	+ 15	+ 12	+ 25	+ 1.74	- 280	- 14	- 31	+134
5	+1.46	+ 018	+ 10	+ 11	- 4	...	...	...	...	...
6	+0.78	+ 010	+ 06	+ 06	- 2	- 0.26	- 086	+ 19	+ 12	+ 53
7	...	...	...	...	...	+ 0.01	- 015	+ 07	+ 06	+ 11
8	+0.89	+ 033	+ 08	+ 10	- 12	+ 0.37	+ 031	- 03	- 01	- 17
9	+1.44	+ 036	+ 06	+ 08	- 15	+ 0.15	+ 011	- 04	- 03	- 8
10	+1.31	- 003	+ 07	+ 06	+ 5	- 0.53	- 027	- 05	- 07	+ 11
11	+0.34	+ 043	- 02	+ 01	- 23	- 0.89	- 024	- 09	- 10	+ 8
12	+0.56	+ 087	- 09	- 03	- 48	...	...	...	...	...
13	+0.13	+ 044	+ 04	+ 07	- 20	- 1.97	- 141	+ 04	- 05	+ 73
14	...	...	...	...	...	- 1.66	- 049	- 18	- 20	+ 16
15	+2.28	- 079	- 31	- 34	+ 24	- 0.02	+ 015	- 01	00	- 8
16	-2.10	- 027	- 10	- 11	+ 9	+ 0.06	+ 023	- 08	- 06	- 16
17	+0.14	+ 010	- 06	- 05	- 8	+ 2.08	+ 071	- 27	- 21	- 49
18	-0.05	- 063	+ 05	+ 01	+ 34	- 0.50	- 050	- 21	- 22	+ 15
19	-2.50	- 061	- 26	- 28	+ 18	...	...	...	...	...
20	-0.31	- 053	+ 05	+ 02	+ 29	- 0.63	+ 017	- 08	- 07	- 13
21	...	...	...	...	...	+ 0.34	+ 041	- 02	+ 01	- 21
22	+1.35	+ 008	- 09	- 08	- 9	+ 2.46	- 014	- 05	- 05	+ 5
23	+0.27	+ 071	- 12	- 07	- 42	- 1.59	- 059	- 14	- 17	+ 23
24	+0.19	+ 031	- 12	- 09	- 22	- 0.85	- 155	+ 09	- 02	+ 83
25	-0.43	- 007	- 05	- 05	+ 1	...	...	...	...	...
26	-2.61	- 052	- 03	- 06	+ 25	...	...	...	...	...
27	-0.49	- 039	- 02	- 04	+ 19	- 0.56	- 016	+ 11	+ 10	+ 14
28	...	...	...	...	...	- 0.39	+ 009	+ 08	+ 08	0
29	+0.01	+ 021	+ 01	+ 03	- 10	+ 0.19	- 056	+ 10	+ 05	+ 33
30	+0.19	+ 010	- 05	- 04	- 8	- 0.22	- 040	+ 08	+ 04	+ 24
31	...	...	...	...	...	+ 0.58	+ 007	+ 01	+ 01	- 3
Absolute values	2° 04'.75	3.48618	13.3022	13.8386	75° 24' 28"	2° 05'.52	3.49069	13.4079	13.8548	75° 24' 26"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JANUARY, 1859.						FEBRUARY, 1859.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	+0'.19	-.00004	+.00046	+.00043	+ 25"	-0'.62	+.00034	-.00003	+.00005	- 16"	
2	...	...	...	...	...	+0.04	+ 009	- 03	- 02	- 6
3	+0.68	+ 043	+ 40	+ 40	- 1	+0.04	+ 010	+ 02	+ 02	- 4	
4	+0.24	+ 059	+ 43	+ 44	- 8	+1.71	- 005	+ 01	+ 01	+ 3	
5	+0.71	+ 036	+ 33	+ 33	- 1	-0.25	000	+ 06	+ 05	+ 3	
6	+0.40	+ 046	+ 37	+ 38	- 5	...	...	...	...	...
7	-0.26	+ 029	+ 44	+ 43	+ 8	+0.68	+ 041	- 16	- 18	- 29	
8	+0.55	+ 008	+ 29	+ 28	+ 10	-0.99	+ 087	- 09	- 03	- 48	
9	...	...	...	...	..	+1.97	- 107	+ 43	+ 33	+ 76
10	-0.66	- 140	- 60	- 65	+ 41	-0.68	- 137	+ 06	- 03	+ 72	
11	+0.73	- 150	- 05	- 15	+ 73	+0.11	- 103	+ 11	+ 04	+ 58	
12	+0.09	- 087	+ 05	- 01	+ 46	-0.71	- 074	+ 14	+ 08	+ 44	
13	-0.85	- 037	- 03	- 05	+ 17	...	...	...	...	...
14	+0.77	+ 009	+ 09	+ 09	0	+0.11	- 022	- 07	- 08	+ 7	
15	+0.16	- 124	+ 20	+ 11	+ 72	-0.02	+ 042	+ 09	+ 11	- 17	
16	...	...	...	...	..	+0.47	+ 001	+ 01	+ 01	0
17	+0.40	- 029	+ 03	+ 01	+ 16	+0.11	- 006	- 05	- 05	+ 1	
18	-1.61	- 020	- 05	- 06	+ 7	-0.44	+ 002	- 13	- 12	- 8	
19	+2.35	- 056	+ 08	+ 04	+ 32	-0.08	+ 045	00	+ 03	- 23	
20	+0.17	+ 028	+ 09	+ 11	- 9	...	...	...	...	...
21	+0.12	+ 039	- 03	00	- 21	-0.08	+ 057	- 09	- 05	- 33	
22	+0.17	+ 021	00	+ 01	- 11	+1.19	+ 001	- 03	- 03	- 2	
23	...	...	...	...	...	+2.07	- 208	+ 23	+ 08	+116
24	+0.45	+ 040	- 14	- 10	- 27	-4.68	- 227	- 65	- 75	+ 82	
25	+0.37	+ 027	- 05	- 03	- 16	-0.29	- 057	- 14	- 17	+ 22	
26	-0.53	+ 027	+ 03	+ 05	- 12	-0.04	- 173	- 16	- 26	+ 79	
27	+0.34	- 037	- 09	- 11	+ 14	...	...	...	...	...
28	-0.02	- 027	+ 03	+ 01	+ 15	-0.11	- 094	+ 15	+ 08	+ 55	
29	-0.37	+ 028	- 03	- 01	- 16	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	+0.35	+ 018	- 14	- 12	- 16	...	...	...	...	...
Absolute values }	2° 06'.41	3.47244	13.3383	13.7829	75° 24' 28"	2° 6'.90	3.47706	13.3635	13.8085	75° 24' 56"	

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MARCH, 1859.						APRIL, 1859.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	-0'.59	-.00058	+.00016	+.00011	+ 37"	+ 0'.50	-.00098	-.00001	-.00007	+ 49"
2	-0.04	— 49	— 24	— 26	+ 13	- 1.79	— 039	+ 019	+ 015	+ 29
3	-1.97	— 65	— 10	— 13	+ 28	...	...	...	...	...
4	+0.66	— 64	— 11	— 15	+ 26	+ 1.26	+ 029	— 012	— 009	— 21
5	-1.15	— 08	— 01	— 01	+ 3	+ 0.25	+ 027	— 005	— 003	— 16
6	...	...	...	...	...	+ 0.13	+ 029	+ 003	+ 005	— 13
7	-0.50	+ 46	— 13	— 09	— 30	+ 0.56	— 007	+ 006	+ 004	+ 6
8	+0.49	+ 02	— 18	— 17	— 10	+ 1.48	— 082	— 013	— 017	+ 35
9	-0.09	+ 48	— 21	— 17	— 35	+ 3.08	— 038	+ 011	+ 008	+ 24
10	+0.80	+ 36	— 13	— 10	— 25	...	...	...	...	...
11	-0.01	+ 22	— 24	— 21	— 23	+ 0.95	+ 035	— 003	— 001	— 19
12	+0.62	+ 09	— 03	— 02	— 6	+ 1.87	+ 088	+ 009	+ 014	— 40
13	...	...	...	...	...	— 0.05	+ 045	— 004	— 001	— 24
14	-1.00	+ 45	+ 02	+ 05	— 22	+ 1.15	+ 011	— 015	— 014	— 13
15	-1.43	+ 78	— 02	+ 03	— 40	— 0.31	+ 017	— 003	— 001	— 10
16	+5.64	— 25	— 57	— 55	— 16	— 0.49	+ 036	— 005	— 002	— 21
17	+1.03	— 76	+ 10	+ 05	+ 43	...	...	...	...	...
18	-0.37	+ 03	+ 04	+ 04	0	+ 2.12	— 006	+ 001	+ 001	+ 4
19	-0.71	+ 21	+ 01	+ 02	— 10	+ 0.04	+ 068	— 001	+ 004	— 35
20	...	...	...	...	...	— 0.47	+ 085	— 016	— 009	— 51
21	+0.76	+ 01	+ 27	+ 25	+ 13	— 3.15	+ 107	+ 131	+ 129	+ 12
22	-0.55	+ 28	+ 17	+ 18	— 6	...	...	...	...	...
23	+0.73	— 06	— 06	— 06	0	— 1.91	— 264	— 014	— 030	+126
24	-0.66	— 30	+ 17	+ 14	+ 23	...	...	...	...	...
25	+0.13	+ 30	+ 20	+ 21	— 5	— 0.85	— 098	+ 003	— 004	+ 51
26	+0.72	— 40	+ 23	+ 19	+ 32	— 0.76	— 109	+ 016	+ 008	+ 63
27	...	...	...	...	...	— 0.81	— 146	+ 026	+ 015	+ 87
28	+0.13	— 20	+ 38	+ 34	+ 29	— 1.37	— 170	— 028	— 037	+ 72
29	-1.35	+ 23	00	+ 02	— 12	+ 4.56	— 256	+ 082	+ 060	+170
30	+1.33	— 89	+ 28	+ 21	+ 59	— 0.24	— 122	— 001	— 008	+ 61
31	-0.05	— 63	+ 04	00	+ 34	...	...	...	...	...
Absolute values	2° 6'.73	3.47519	13.3569	13.8016	75° 24' 58"	2° 6'.56	3.47957	13.3822	13.8272	75° 25' 30"

TABLE XLIX.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MAY, 1859.						JUNE, 1859.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	...	...	...	...	...	+0.49	+0.00005	.00000	.00000	— 2"
2	+0.81	— .00029	+ .00027	+ .00024	+ 28"	— 1.29	+ 036	— 07	— 04	— 22
3	— 0.77	— 34	+ 18	+ 15	+ 26	— 0.70	+ 063	+ 01	+ 05	— 81
4	+0.50	— 10	+ 04	+ 03	+ 7	+2.18	+ 017	— 03	— 02	— 10
5	+1.07	— 41	+ 08	+ 05	+ 25	...	...	...	...	...
6	+0.07	— 10	+ 02	+ 01	+ 6	+2.11	— 019	+ 13	+ 11	+ 16
7	+0.80	— 23	+ 02	00	+ 13	— 0.83	— 004	+ 10	+ 09	+ 7
8	...	...	...	...	...	+2.94	+ 023	+ 12	+ 13	— 6
9	+0.83	+ 25	— 06	— 04	— 15	+1.89	— 199	+ 02	— 11	+101
10	— 0.40	+ 22	+ 10	+ 11	— 6	— 0.73	— 091	+ 20	+ 13	+ 56
11	+0.48	+ 40	— 03	00	— 22	— 0.26	— 097	— 03	— 09	— 48
12	— 0.48	— 24	+ 02	00	+ 13	...	...	...	...	...
13	+1.21	— 70	+ 03	— 02	+ 36	— 0.12	— 014	+ 07	+ 05	+ 10
14	+0.04	— 16	— 03	— 04	+ 7	— 0.50	+ 036	+ 07	+ 09	— 14
15	...	...	...	...	...	— 0.12	+ 066	+ 41	+ 42	— 18
16	— 0.24	— 19	— 14	— 15	+ 2	+2.33	— 085	— 03	— 09	+ 41
17	— 0.32	+ 36	+ 09	+ 11	— 14	+1.99	— 033	+ 25	+ 22	+ 30
18	+0.67	+ 46	— 13	— 09	— 30	— 0.91	— 081	+ 07	+ 02	+ 45
19	+2.85	— 71	+ 54	+ 46	+ 63	...	...	...	...	...
20	+2.54	— 98	+ 27	+ 19	+ 63	— 0.40	+ 021	— 05	— 04	— 13
21	— 2.01	— 30	— 12	— 13	+ 9	— 0.53	— 002	+ 05	+ 05	+ 4
22	...	...	...	...	...	— 0.91	— 011	+ 04	+ 03	+ 8
23	— 0.73	— 93	+ 01	— 05	+ 47	— 0.12	+ 027	— 07	— 05	— 17
24	— 0.91	— 07	— 10	— 10	— 2	— 0.73	+ 049	— 10	— 06	— 30
25	— 1.88	+ 83	— 17	— 14	— 25	+0.92	+ 021	— 06	— 05	— 14
26	+1.02	+ 18	— 04	— 03	— 11	...	...	...	...	...
27	— 0.86	+ 26	— 02	00	— 14	+0.35	— 052	— 07	— 10	+ 23
28	+0.71	+ 84	— 04	+ 01	— 45	+0.97	+ 030	— 08	— 06	— 19
29	...	...	...	...	...	— 0.26	+ 050	— 08	— 04	— 29
30	+0.51	— 15	— 07	— 07	+ 4	— 0.15	+ 008	+ 01	+ 02	— 3
31	+0.89	+ 32	— 10	— 07	— 21	...	...	...	...	...
Absolute values }	2° 6'.84	3.47706	13.3545	13.7997	75° 24' 22"	2° 6'.90	3.47927	13.3667	13.8120	75° 24' 36"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JULY, 1859.						August, 1859.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	-0.39	+ .00038	-.00005	-.00002	- 51"	-0.49	+ .00012	+ .00002	+ .00003	- 5"
2	+0.33	+ 043	- 081	- 026	- 87	+0.01	+ 028	+ 05	+ 06	- 12
3	...	...	...	...	...	-1.10	+ 088	- 02	00	- 20
4	+1.09	+ 003	+ 002	+ 002	- 1	-0.01	+ 062	+ 27	+ 30	- 18
5	+0.06	+ 007	+ 008	+ 008	+ 1	-0.94	+ 044	- 04	- 01	- 24
6	-0.22	+ 032	+ 014	+ 015	- 9	+0.42	+ 038	- 12	- 09	- 25
7	-0.35	- 003	- 003	- 003	0	...	...	...	...	...
8	-1.20	+ 025	- 011	- 008	- 18	+0.86	+ 075	- 02	+ 03	- 39
9	-0.63	+ 035	- 008	- 002	- 47	+0.61	+ 041	- 16	- 12	- 29
10	...	...	...	...	...	-0.55	- 017	- 09	- 09	+ 4
11	+2.71	+ 193	+ 150	+ 153	- 21	-1.73	+ 032	- 03	- 01	- 18
12	-0.52	- 088	+ 005	- 001	+ 47	+0.39	+ 066	00	+ 04	- 33
13	-0.86	- 068	- 007	- 011	+ 31	+1.73	+ 038	- 14	- 11	- 26
14	-0.60	- 011	+ 007	+ 005	+ 9	...	...	...	...	...
15	-2.05	+ 011	- 005	- 004	- 8	+1.25	+ 028	- 25	- 21	- 26
16	+1.58	+ 077	- 025	- 019	- 52	+2.38	- 081	- 37	- 40	+ 22
17	...	...	...	...	...	-0.98	- 053	- 06	- 09	+ 24
18	+1.77	- 185	- 044	- 053	+ 71	+1.02	+ 016	- 03	- 02	- 10
19	-1.98	- 017	- 011	- 011	+ 3	+0.63	- 061	+ 23	+ 17	+ 42
20	-0.05	- 004	+ 014	+ 013	+ 9	-0.08	- 049	- 09	- 12	- 20
21	+1.01	- 071	+ 019	+ 013	+ 45	...	...	...	...	...
22	+0.58	+ 011	- 011	- 009	- 11	-0.01	- 111	+ 01	- 06	+ 57
23	+0.14	- 037	- 025	- 026	+ 6	+0.95	- 070	+ 13	+ 08	+ 42
24	...	...	...	...	...	+0.54	- 049	+ 01	- 02	+ 25
25	+1.07	- 016	+ 013	+ 011	+ 15	+0.34	+ 013	00	+ 01	- 6
26	-1.29	+ 043	- 009	- 006	- 26	+1.65	- 071	+ 11	+ 05	+ 41
27	+0.25	+ 026	- 004	- 002	- 15	+0.90	- 034	+ 14	+ 11	+ 25
28	+0.17	+ 028	- 018	- 015	- 23	...	...	...	...	...
29	+0.36	- 061	- 012	- 015	+ 25	+1.15	- 746	+ 28	- 21	+390
30	-0.73	+ 002	- 009	- 008	- 5	-1.64	- 365	+ 55	+ 28	+211
31	...	...	...	...	...	-1.86	- 288	+ 49	+ 28	+170
Absolute values }	2° 7' .24	3.48276	18.3716	13.8177	75° 24' 4"	2° 7' .89	3.50152	18.4597	13.9077	75° 25' 4"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

SEPTEMBER, 1859.						OCTOBER, 1859.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	-12.81	-.00017	-.00140	-.00133	- 62"	-1.53	+.00227	-.00005	+.00010	-117"	
2	+ 8.17	- 1515	+ 278	+ 164	+ 903	...	...	...	...	...
3	+ 0.34	- 0489	- 023	- 052	+ 235	-1.77	- 014	- 44	- 43	- 15	
4	...	...	...	...	...	+0.14	+ 010	- 49	- 45	- 30
5	+ 0.65	- 0531	- 034	- 065	+ 251	-1.12	+ 147	- 65	- 51	-107	
6	+ 3.12	- 0264	+ 012	- 005	+ 139	+0.46	+ 090	- 14	- 08	- 52	
7	+ 0.65	- 0068	+ 012	+ 007	+ 40	+0.45	+ 064	- 21	- 15	- 43	
8	+ 0.94	- 0013	+ 006	+ 005	+ 10	-0.32	+ 090	- 75	- 64	- 83	
9	- 0.54	- 0041	+ 019	+ 015	+ 30	...	...	...	...	...
10	+ 0.50	+ 0051	- 003	+ 001	- 27	+0.88	+ 144	- 52	- 39	- 99	
11	...	...	...	...	...	+0.79	+ 070	- 39	- 32	- 55
12	+ 1.60	- 0007	- 003	- 003	+ 2	-5.20	- 435	+ 27	- 08	+233	
13	+ 0.57	- 0010	- 004	- 004	+ 3	+0.50	- 183	+ 32	+ 18	+108	
14	+ 0.97	- 0191	- 004	- 016	+ 94	-0.35	- 024	+ 05	+ 03	+ 15	
15	+ 0.27	- 0097	+ 002	- 005	+ 50	-0.36	- 046	+ 02	- 01	+ 24	
16	- 2.33	- 0114	- 027	- 033	+ 44	...	...	...	...	...
17	+ 1.15	- 0082	+ 010	+ 004	+ 47	...	...	...	...	...
18	...	...	...	...	...	-0.96	- 760	- 39	- 85	+363
19	- 0.04	- 0014	+ 007	+ 005	+ 10	+0.81	- 143	+ 22	+ 11	+ 83	
20	+ 0.22	+ 0016	- 003	- 001	- 9	-5.10	- 324	- 37	- 55	+145	
21	+ 0.19	+ 0056	- 002	+ 002	- 29	-8.22	- 435	- 59	- 82	+190	
22	- 0.35	+ 0057	+ 006	+ 009	- 25	+1.53	- 218	+ 35	+ 19	+128	
23	- 0.04	+ 0117	+ 007	+ 014	- 55	...	...	...	...	...
24	- 1.38	+ 0348	+ 062	+ 080	- 145	-0.35	- 020	+ 17	+ 14	+ 18	
25	...	...	...	...	...	+0.45	+ 015	+ 16	+ 16	+ 1
26	+ 0.23	+ 0105	- 003	+ 003	- 55	-0.51	+ 022	+ 14	+ 14	- 4	
27	- 0.94	+ 0106	- 004	+ 003	- 55	-0.31	+ 028	+ 03	+ 04	- 13	
28	- 0.48	+ 0091	+ 001	+ 007	- 45	+1.58	+ 014	+ 06	+ 07	- 4	
29	- 0.66	+ 0063	- 005	- 001	- 35	-1.55	- 089	+ 18	+ 11	+ 54	
30	- 0.61	+ 0112	- 016	- 008	- 64	...	...	...	...	...
31	...	...	...	...	...	-0.42	+ 013	+ 14	+ 14	0
Absolute values }	2° 08.77	3.47990	13.3755	13.8208	75° 25' 0"	2° 8.52	3.48423	13.4151	13.8602	75° 26' 26"	

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

NOVEMBER, 1859.						DECEMBER, 1859.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0.92	-.00066	+.00003	-.00002	+ 35"	+1.30	+.00144	+.00009	.00000	- 77"
2	+0.06	- 045	+ 07	+ 04	+ 26	+0.52	+ 174	00	+ 11	- 87
3	+0.27	- 015	+ 02	+ 01	+ 9	+0.53	+ 142	+ 10	- 01	- 77
4	+0.45	- 001	- 08	- 07	- 4	...	...	...	...	...
5	+0.14	+ 028	+ 07	+ 09	- 10	-0.98	- 025	- 12	- 13	+ 7
6	...	...	...	...	...	+5.73	- 079	- 08	- 12	+ 36
7	+0.96	- 034	- 06	- 08	+ 14	+0.79	- 098	+ 11	+ 04	+ 55
8	+0.14	- 063	- 02	- 05	+ 31	-1.79	- 059	- 12	- 15	+ 24
9	-0.30	- 053	+ 01	- 03	+ 27	-1.15	- 024	- 05	- 06	+ 10
10	+1.69	- 159	+ 24	+ 12	+ 92	+1.24	- 139	- 23	- 30	+ 58
11	+1.73	- 116	- 13	- 20	+ 52	...	...	...	...	...
12	+0.32	- 218	- 16	- 29	+ 102	+0.09	- 060	+ 09	+ 04	+ 34
13	...	...	...	...	...	-5.13	- 510	- 19	- 51	+247
14	-0.84	- 122	+ 30	+ 20	+ 76	+6.58	- 402	- 02	- 28	+201
15	-0.11	- 111	+ 04	- 03	+ 58	-0.87	- 166	+ 11	00	+ 90
16	-1.27	- 095	- 09	- 15	+ 43	-2.06	000	+ 06	+ 06	+ 3
17	-0.09	+ 001	+ 38	+ 36	+ 19	-0.27	+ 002	+ 14	+ 13	+ 6
18	-0.09	+ 027	- 09	+ 11	- 9	...	...	...	...	...
19	-0.13	+ 033	- 10	+ 11	- 11	-0.08	+ 072	+ 01	+ 06	- 36
20	...	...	...	...	...	-1.21	+ 079	+ 10	+ 14	- 35
21	-0.27	+ 012	- 15	- 13	- 14	-0.20	- 003	+ 09	+ 08	+ 6
22	-0.25	+ 041	- 02	+ 04	- 20	-0.37	+ 038	- 04	- 01	- 21
23	-0.24	+ 053	+ 08	- 04	- 31	-1.75	+ 075	+ 15	- 09	- 45
24	+0.24	+ 044	+ 15	- 11	- 30	-0.08	+ 028	+ 01	+ 01	- 15
25	+0.12	+ 068	- 16	- 10	- 42	...	...	...	...	...
26	-0.16	+ 054	- 06	- 02	- 30	...	...	...	...	...
27	...	...	...	...	...	+0.52	+ 071	- 08	- 08	- 40
28	+0.12	+ 057	- 23	- 18	- 40	+0.59	- 020	- 09	- 10	+ 5
29	-0.24	+ 088	- 09	- 03	- 49	-0.35	- 045	- 37	- 38	+ 4
30	+0.19	+ 033	- 21	- 18	- 28	+0.12	- 073	- 10	- 14	+ 32
31	...	...	...	...	...	+0.71	- 046	- 11	- 18	+ 17
Absolute values }	2° 8' .53	3.48159	13.3985	13.8435	75° 26' 2"	2° 8' .27	3.48251	13.3738	13.8198	75° 24' 16"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JANUARY, 1860.						FEBRUARY, 1860.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	...	...	...	...	...	-0.27	-.00021	-.00012	-.00012	+ 5"
2	-0.37	-.00010	-.00009	-.00009	0"	-0.50	+ 010	- 02	- 01	- 6
3	-0.30	- 018	- 13	- 13	+ 3	+0.18	- 027	- 01	- 02	+ 18
4	+1.60	- 004	+ 02	+ 01	+ 3	-0.30	+ 012	- 05	- 04	- 8
5	-0.47	- 065	+ 07	+ 02	+ 36	...	...	...	...	...
6	-0.52	- 060	+ 04	00	+ 33	-0.40	+ 066	+ 02	+ 06	- 32
7	+0.06	- 041	- 05	- 08	+ 18	-0.46	+ 069	+ 04	+ 08	- 33
8	...	...	...	...	...	+0.12	+ 054	- 01	+ 02	- 28
9	+0.38	+ 074	+ 01	+ 06	- 37	+0.07	+ 085	+ 03	+ 08	- 41
10	+2.45	+ 106	- 17	- 09	- 62	-0.50	- 004	+ 04	+ 04	+ 4
11	+2.04	- 075	+ 24	+ 18	+ 50	+0.69	+ 019	- 25	- 22	- 22
12	-0.09	- 050	+ 01	- 03	+ 26	...	...	...	...	...
13	+0.61	- 016	+ 01	00	+ 8	-1.45	- 053	- 28	- 30	+ 12
14	+0.47	+ 006	+ 04	+ 04	- 1	+0.09	- 035	- 04	- 06	+ 16
15	...	...	...	...	...	+0.22	+ 011	- 05	- 04	- 8
16	-0.18	+ 035	- 02	00	- 18	+0.90	+ 017	- 13	- 11	- 15
17	-0.02	+ 009	- 01	00	- 5	+0.73	- 063	- 30	- 32	+ 17
18	-0.22	+ 068	- 02	+ 02	- 35	+3.74	- 142	- 02	- 11	+ 70
19	+0.34	+ 089	- 12	- 09	- 26	...	...	...	...	...
20	-0.86	+ 018	+ 03	+ 04	- 8	-1.53	+ 073	- 20	- 23	+ 27
21	+0.09	- 088	+ 06	00	+ 47	-5.05	- 331	- 30	- 49	+152
22	...	...	...	...	...	-0.61	- 184	+ 48	+ 33	+117
23	-0.94	+ 011	+ 02	+ 02	- 4	-0.32	- 077	+ 25	+ 19	+ 51
24	+0.41	+ 006	00	00	- 3	-0.94	- 070	+ 16	+ 11	+ 43
25	-0.53	+ 014	+ 03	+ 04	- 6	-0.47	- 053	+ 03	- 01	+ 28
26	-0.45	+ 022	+ 11	+ 12	- 6	...	...	...	...	...
27	+0.23	- 042	+ 04	+ 01	+ 23	+0.29	+ 015	- 06	- 05	- 11
28	-1.68	- 059	- 20	- 23	- 19	+0.97	+ 019	- 04	- 02	- 12
29	...	...	...	...	...	-0.21	+ 022	+ 05	+ 06	- 8
30	+0.61	- 017	- 06	- 07	+ 5	...	...	...	...	...
31	-0.72	- 026	- 12	- 13	+ 7	...	...	...	...	...
Absolute values }	2° 8' 53	3.47714	13.3548	13.8000	75° 24' 22"	2° 9' 26	3.48418	13.3675	13.8141	75° 23' 28"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MARCH, 1860.						APRIL, 1860.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0.79	+ .00031	-.00002	+ .00001	- 17"	...	...	...	...	...
2	+1.41	+ 0063	- 008	- 008	- 35	+ 1.23	-.00080	+ .00005	.00000	+ 43"
3	+0.86	+ 0008	- 012	- 011	- 10	- 0.42	- 065	- 07	- 11	+ 29
4	...	...	...	...	...	- 0.75	- 014	+ 01	00	+ 07
5	-0.76	+ 0001	- 021	- 020	- 11	- 0.79	+ 002	+ 11	+ 11	+ 05
6	-0.04	+ 0025	- 010	- 008	- 17	...	...	...	...	...
7	-0.51	+ 0132	- 028	- 018	- 81	- 0.07	+ 042	+ 08	+ 06	- 20
8	-1.22	- 0050	- 018	- 020	+ 16	...	...	...	...	...
9	-0.24	+ 0018	- 018	- 016	- 15	- 3.50	- 096	- 01	- 07	+ 48
10	+0.48	+ 0019	- 028	- 020	- 21	- 0.97	- 104	- 08	- 16	+ 48
11	...	...	...	...	...	+ 1.11	- 038	+ 23	+ 19	+ 31
12	+1.05	+ 0004	- 014	- 013	- 9	- 0.63	- 139	+ 10	00	+ 75
13	+1.61	- 0079	- 019	- 022	+ 30	- 0.69	- 297	- 43	- 59	+128
14	-0.10	- 0002	+ 026	+ 024	+ 14	+ 0.28	- 175	+ 12	00	+ 94
15	-0.08	- 0015	+ 008	+ 006	+ 11	...	...	...	...	...
16	-0.22	- 0018	- 006	- 006	+ 3	- 1.43	- 078	+ 18	+ 07	+ 46
17	+1.49	- 0171	- 002	- 012	+ 86	- 0.40	+ 023	+ 18	+ 18	- 3
18	...	...	...	...	...	+ 0.87	- 082	+ 06	+ 08	+ 19
19	-2.23	- 0046	- 010	- 012	+ 18	+ 0.73	- 027	+ 18	+ 10	+ 20
20	+0.14	- 0014	+ 021	+ 019	+ 18	- 2.56	- 013	+ 06	+ 05	+ 10
21	-0.01	- 0011	+ 001	000	+ 6	+ 0.60	+ 052	+ 14	+ 16	- 19
22	+0.86	+ 0016	+ 030	+ 029	+ 7	...	...	...	...	...
23	+0.48	+ 0019	- 002	- 001	- 11	+ 0.77	+ 067	- 08	+ 01	- 35
24	-0.10	+ 0031	+ 007	+ 009	- 12	+ 0.75	+ 040	- 09	- 06	- 25
25	...	...	...	...	...	+ 0.01	+ 102	- 08	- 01	- 55
26	+0.23	+ 0004	- 008	- 007	- 6	+ 2.10	+ 031	- 17	- 14	- 24
27	+3.52	- 0194	- 082	- 089	+ 57	+ 0.40	+ 057	- 11	- 06	- 34
28	-1.74	- 1415	- 102	- 186	+ 661	+ 0.23	+ 082	- 16	- 10	- 49
29	+3.58	- 0197	+ 033	+ 018	+ 116	...	...	...	...	...
30	-0.58	- 0178	+ 023	+ 010	+ 101	+ 0.77	+ 100	- 42	- 33	- 71
31	+1.88	- 0095	+ 028	+ 020	+ 62	...	...	...	...	...
Absolute values }	2° 9' 95	3.47603	13.3537	13.7987	75° 24' 84"	2° 9' 61	3.47671	13.3648	13.8097	75° 25' 6"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MAY, 1860.						JUNE, 1860.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	-0'.29	-.00031	+.00012	+.00009	+ 22"	-0'.55	-.00028	-.00006	-.00007	+ 11"
2	-0.92	— 014	+ 08	+ 06	+ 11	+0.46	— 010	— 05	— 05	+ 3
3	+0.77	— 013	— 03	— 04	+ 5	...	...	...	...	...
4	+0.66	+ 041	— 13	— 09	— 27	-0.02	+ 012	+ 08	+ 08	— 2
5	+3.86	— 169	— 11	— 21	+ 79	-0.24	— 003	+ 11	+ 10	+ 7
6	...	...	...	...	...	-0.50	+ 036	— 16	— 13	— 26
7	-0.27	— 089	+ 16	+ 09	+ 53	-0.42	+ 009	+ 05	+ 05	— 2
8	-1.25	— 034	— 03	— 05	+ 16	-1.33	— 021	+ 03	+ 01	+ 12
9	+2.50	— 019	+ 01	+ 02	+ 11	-0.87	— 032	+ 04	+ 02	+ 18
10	+1.94	— 137	+ 10	+ 01	+ 74	...	...	...	...	...
11	+3.38	— 157	+ 05	— 05	+ 82	+0.71	— 160	— 31	— 39	+ 65
12	-0.42	— 081	+ 11	+ 05	+ 46	-0.74	— 085	+ 07	+ 02	+ 46
13	...	...	...	...	...	-1.11	— 064	+ 09	+ 04	+ 37
14	-1.30	— 043	— 05	— 08	+ 19	+0.21	— 045	+ 05	+ 02	+ 25
15	-0.49	— 002	00	00	+ 1	-0.73	+ 002	— 03	— 02	— 3
16	-1.02	— 014	— 03	— 04	+ 6	-0.07	+ 020	+ 01	+ 02	— 9
17	-0.73	— 039	— 26	— 27	+ 7	...	...	...	...	...
18	-0.83	— 017	— 02	— 03	+ 8	-0.48	— 021	+ 29	+ 25	+ 25
19	-0.74	+ 015	— 02	— 01	— 9	-0.42	— 017	+ 06	+ 05	+ 11
20	...	...	...	...	...	+0.03	+ 043	00	+ 02	— 22
21	-0.96	+ 003	+ 03	+ 03	0	-0.27	+ 056	— 02	+ 02	— 29
22	-0.49	+ 020	— 09	— 07	— 15	-0.19	+ 012	— 14	— 12	— 13
23	-0.35	— 042	+ 20	+ 16	+ 31	+0.70	+ 093	— 23	— 16	— 58
24	+2.59	— 098	+ 16	+ 09	+ 57	...	...	...	...	...
25	+0.47	+ 058	+ 04	+ 07	— 27	+1.02	+ 032	— 02	00	— 17
26	-1.44	+ 100	— 03	+ 04	— 52	+0.39	+ 032	— 01	+ 01	— 16
27	...	...	...	...	...	+0.35	+ 046	— 01	+ 02	— 23
28	+2.05	+ 028	— 13	— 11	— 21	+2.93	+ 067	+ 16	+ 20	— 26
29	+0.83	+ 045	+ 03	+ 05	— 21	+0.41	+ 038	+ 52	+ 51	+ 7
30	-0.32	+ 058	— 10	— 05	— 34	+0.34	— 227	+ 46	+ 29	+137
31	+1.40	+ 064	— 02	+ 02	— 34	...	...	...	...	...
Absolute values	2° 8'.93	3.48621	13.3880	13.8345	75° 24' 16"	2° 8'.93	3.48223	13.3584	13.8048	75° 23' 22"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JULY, 1860.						AUGUST 1860.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	...	...	...	...	...	+2.00	+ .00131	-.00003	+ .00006	- 67"
2	+3.42	-.00212	+ .00024	+ .00009	+ 119"	-0.28	+ 030	+ 04	+ 06	- 13
3	+2.66	- 074	+ 11	+ 006	+ 43	+0.26	+ 086	+ 06	+ 11	- 40
4	+0.91	- 068	+ 35	+ 028	+ 52	+0.85	+ 115	- 09	- 01	- 62
5	-2.97	- 725	- 77	- 118	+ 326	...	...	...	...	...
6	-0.32	- 151	+ 14	+ 004	+ 84	-1.76	+ 125	00	+ 08	- 63
7	-1.12	- 068	- 07	- 011	+ 31	-5.81	- 589	- 59	- 92	+267
8	...	...	...	...	...	-4.73	- 432	- 30	- 55	+203
9	-1.45	+ 061	- 01	+ 003	- 31	-2.12	- 195	- 06	- 18	+ 95
10	+0.14	+ 102	+ 01	+ 007	- 51	+1.59	- 218	- 27	- 40	+ 96
11	+1.85	+ 117	- 23	- 014	- 70	+0.48	- 094	- 06	- 12	+ 44
12	+1.31	- 174	- 10	- 020	+ 83	...	...	...	...	...
13	-0.76	- 005	- 03	- 003	+ 1	-6.48	- 486	- 20	- 50	+235
14	+0.38	+ 003	+ 11	+ 011	+ 4	-1.17	- 100	+ 10	+ 03	+ 56
15	...	...	...	...	...	+1.87	- 069	+ 10	+ 05	+ 40
16	+2.87	+ 051	- 04	000	- 28	-1.25	- 009	+ 61	+ 56	+ 35
17	+0.88	- 005	+ 02	+ 001	+ 4	-0.67	- 096	+ 14	+ 07	+ 55
18	+2.72	+ 002	+ 09	+ 009	+ 4	+5.80	- 035	- 03	- 06	+ 16
19	-1.15	+ 001	- 26	- 024	- 13	...	...	...	...	...
20	+1.35	- 016	- 20	- 020	- 2	+3.55	+ 024	+ 13	+ 14	- 5
21	+0.77	+ 005	+ 06	+ 005	0	+1.43	+ 003	+ 23	+ 27	+ 13
22	...	...	...	...	...	+4.83	- 064	- 16	- 19	+ 24
23	-1.19	+ 009	- 09	- 008	- 9	-0.59	- 029	- 11	- 12	+ 9
24	+0.17	- 084	- 20	- 024	+ 32	-0.75	+ 054	+ 15	+ 17	- 20
25	-1.25	- 004	- 03	- 003	+ 1	+0.04	+ 027	+ 02	+ 03	- 13
26	+0.92	- 088	- 12	- 014	+ 13	...	...	...	...	...
27	-0.49	+ 029	- 13	- 011	- 21	+0.71	+ 013	+ 02	+ 03	- 6
28	-0.40	- 025	- 02	- 003	+ 12	+2.16	+ 010	- 05	- 04	- 8
29	...	...	...	...	...	+1.27	+ 023	+ 02	+ 04	- 12
30	-1.04	000	- 10	- 009	- 5	+1.45	- 008	- 02	- 03	+ 3
31	-0.61	- 031	- 03	- 005	+ 14	+1.77	- 030	+ 07	+ 05	+ 19
Absolute values }	2° 10' 38"	3.48052	13.3651	13.8109	75° 24' 12"	2° 11' 36"	3.47780	13.3685	13.8135	75° 25' 4"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

SEPTEMBER, 1860.						OCTOBER, 1860.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	+ 1.74	+ .00002	+ .00005	+ .00005	+ 1"	+ 2.52	-.00062	-.00017	-.00020	+ 23"	
2	...	...	...	...	...	-0.07	- 057	+ 16	+ 11	+ 37
3	+ 0.78	+ 0005	- 009	- 008	- 7	-5.64	- 218	- 27	- 39	+ 96	
4	- 0.59	+ 0016	+ 028	+ 027	+ 6	-0.81	- 131	+ 40	+ 29	+ 86	
5	+ 0.40	- 0093	- 024	- 028	+ 35	+0.34	- 070	+ 15	+ 09	+ 43	
6	-11.71	- 1083	- 112	- 174	+ 489	-0.34	- 048	+ 16	+ 12	+ 32	
7	+ 5.77	- 0337	+ 079	+ 052	+ 209	...	...	...	...	...
8	- 0.14	- 0180	+ 017	+ 005	+ 99	+0.27	- 034	+ 10	+ 08	+ 22	
9	...	...	...	...	...	+0.37	- 016	+ 06	+ 04	+ 11
10	+ 0.79	- 0161	+ 014	+ 002	+ 88	-0.07	- 016	+ 03	+ 02	+ 10	
11	+ 0.89	- 0023	+ 012	+ 010	+ 17	+0.83	- 021	+ 05	+ 03	+ 13	
12	+ 0.31	- 0024	+ 001	- 001	+ 13	-0.47	+ 009	- 02	- 02	- 6	
13	+ 0.63	- 0010	- 001	- 001	+ 5	-0.18	+ 006	- 09	- 08	- 8	
14	+ 0.27	+ 0029	+ 008	+ 009	- 10	...	...	...	...	...
15	+ 0.58	- 0196	- 090	- 096	+ 53	-0.81	+ 027	- 03	- 01	- 15	
16	...	...	...	...	...	+0.70	+ 022	00	+ 02	- 11
17	+ 0.56	- 0054	000	- 004	+ 27	-0.19	- 021	- 02	- 03	+ 10	
18	+ 0.07	0000	+ 012	+ 011	+ 6	-0.17	- 016	- 04	- 05	+ 6	
19	- 1.39	0000	- 031	+ 029	- 16	-0.31	+ 037	- 23	- 20	- 30	
20	- 0.41	- 0018	+ 007	+ 006	+ 13	+0.50	+ 086	- 01	+ 02	- 19	
21	- 0.45	- 0002	- 012	- 011	- 5	...	...	...	...	...
22	- 0.92	+ 0014	- 001	000	- 7	+0.06	+ 071	- 12	- 06	- 41	
23	...	...	...	...	...	-0.12	+ 038	+ 10	+ 12	- 14
24	- 0.81	+ 0061	- 011	- 007	- 36	+0.48	+ 059	- 15	- 11	- 37	
25	- 0.81	+ 0160	+ 024	+ 032	- 69	-0.31	+ 057	- 09	- 04	- 33	
26	- 0.67	- 0005	+ 023	+ 021	+ 14	+0.66	+ 030	- 11	- 09	- 21	
27	+ 1.09	+ 0020	+ 002	+ 003	- 9	-0.42	- 092	00	- 06	+ 46	
28	- 0.88	+ 0049	- 011	- 008	- 30	...	...	...	...	...
29	0.00	- 0006	- 011	- 011	- 2	-1.49	- 107	+ 27	+ 18	+ 68	
30	...	...	...	...	...	-2.81	- 071	+ 10	+ 05	+ 41
31	...	...	...	...	...	-0.14	- 019	- 18	- 18	+ 1
Absolute values }	2° 10'.77	3.47901	13.8944	13.8389	75° 26' 24"	2° 13'.91	3.47740	13.8819	13.8263	75° 26' 00"	

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

NOVEMBER, 1860.						DECEMBER, 1860.					
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	-0'.12	-.00038	+.00011	+.00008	+ 25"	-0'.72	-.00012	+.00002	-.00002	+ 5"	
2	-0.54	-.055	+ 20	+ 16	+ 38	...	...	...	...	...
3	-0.22	-.056	+ 12	+ 08	+ 35	+0.10	-.116	-.07	-.14	+ 55	
4	...	...	...	...	...	+0.34	+ 036	-.01	+ 01	- 19	
5	+0.37	-.053	+ 23	+ 18	+ 38	+0.28	+ 076	+ 04	+ 08	- 37	
6	+0.90	-.010	+ 07	+ 06	+ 8	+0.24	+ 043	-.15	-.11	- 30	
7	-0.04	-.009	+ 13	+ 11	+ 11	0.00	+ 076	-.09	-.03	- 43	
8	+0.50	+ 004	+ 04	+ 04	0	+0.03	+ 051	+ 07	+ 10	- 22	
9	-0.15	-.009	-.01	-.02	+ 4	...	...	...	...	...
10	+0.22	+ 019	-.04	-.02	- 12	+1.54	-.130	+ 31	+ 21	+ 81	
11	...	...	...	...	...	-3.32	-.128	-.03	-.11	+ 63	
12	+0.25	+ 036	-.02	+ 01	- 19	-0.32	-.080	+ 22	+ 15	+ 51	
13	-0.14	+ 054	-.06	-.02	- 30	-0.56	-.042	+ 09	+ 06	+ 26	
14	0.00	+ 006	-.02	-.02	- 4	-0.35	+ 011	+ 04	+ 04	- 4	
15	+0.81	+ 031	-.04	-.02	- 18	-0.38	+ 264	+ 33	+ 48	-116	
16	-0.18	+ 009	-.04	-.03	- 6	...	...	...	...	...
17	-0.40	+ 041	+ 03	+ 06	- 19	-0.08	-.093	+ 07	00	+ 50	
18	...	...	...	...	...	+0.03	-.026	+ 09	+ 07	+ 17	
19	+0.54	+ 088	-.01	+ 05	- 45	+1.69	+ 031	+ 09	+ 10	- 11	
20	+0.04	+ 028	-.05	-.03	- 17	-0.56	-.020	+ 04	+ 03	+ 12	
21	+0.72	+ 020	-.06	-.05	- 13	-0.94	-.008	+ 04	+ 03	+ 6	
22	+0.39	+ 067	-.21	-.15	- 44	-0.04	-.033	-.07	-.09	+ 13	
23	-2.36	-.056	+ 12	+ 08	+ 34	...	...	...	...	...
24	+0.72	-.021	-.06	-.07	+ 7	+0.63	+ 007	-.10	-.09	- 9	
25	...	...	...	...	...	...	...	...	...	...
26	+0.18	-.032	-.20	-.20	+ 6	+0.39	-.010	-.19	-.18	- 4	
27	-1.38	-.027	-.07	-.08	+ 10	0.00	+ 005	+ 04	+ 04	0	
28	+0.86	-.051	-.07	-.10	+ 22	-0.14	-.008	-.09	-.09	- 1	
29	-0.63	-.051	+ 09	+ 05	+ 30	+0.32	+ 101	-.13	-.06	- 58	
30	-0.86	-.034	-.18	-.19	+ 9	...	...	...	...	...
31	...	...	...	...	...	+0.14	+ 026	-.12	-.10	- 19	
Absolute values } 2° 13' 30" 3.47690 13.3454 13.7908 75° 23' 50"						2° 12' 62" 3.47600 13.3435 13.7888 75° 23' 56"					

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JANUARY, 1861.						FEBRUARY, 1861.				
Day of Month.	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0.49	+ .00077	-.00011	-.00005	- 44"	+ 0.36	-.00068	+ .00023	+ .00017	+ 46"
2	+0.09	+ 005	+ 09	+ 09	+ 2	+ 0.26	- 022	+ 25	+ 22	+ 24
3	-0.07	- 015	+ 10	+ 09	+ 13	...	...	...	...	...
4	-0.86	- 048	+ 14	+ 10	+ 31	- 0.53	- 001	+ 06	+ 06	+ 4
5	+0.11	+ 021	- 19	- 16	- 20	+ 0.18	+ 005	+ 07	+ 06	+ 1
6	...	...	...	...	...	+ 0.40	+ 046	+ 04	+ 06	- 21
7	+0.07	- 003	+ 08	+ 07	+ 6	- 0.23	+ 011	- 28	- 26	- 20
8	-0.72	- 010	+ 01	00	+ 5	- 0.12	+ 020	- 37	- 34	- 29
9	+0.86	+ 038	- 09	- 06	- 23	+ 0.62	+ 044	- 04	- 01	- 24
10	+0.22	+ 082	- 11	- 05	- 47	...	...	...	...	...
11	+1.82	+ 010	- 26	- 24	- 18	+ 0.35	- 014	- 14	- 14	0
12	-0.25	+ 020	- 17	- 14	- 19	+ 0.24	- 034	+ 18	+ 15	+ 26
13	...	...	...	...	...	- 0.23	- 031	+ 05	+ 02	+ 18
14	+0.13	- 020	- 21	- 21	- 1	- 0.45	+ 018	- 01	00	- 10
15	-0.14	+ 022	- 08	- 06	- 15	+ 0.74	+ 009	+ 02	+ 02	- 4
16	-0.80	- 024	00	- 01	+ 12	- 1.17	- 052	00	- 03	+ 26
17	+0.11	+ 008	+ 08	+ 08	0	...	...	...	...	...
18	+0.44	- 012	- 08	- 08	+ 2	- 0.54	+ 007	+ 06	+ 06	- 1
19	+0.92	+ 009	- 08	- 07	- 9	- 0.86	+ 002	+ 08	- 07	- 5
20	...	...	...	...	...	+ 0.31	+ 011	- 05	- 04	- 8
21	-0.21	- 061	- 10	- 13	+ 26	- 0.01	- 064	00	- 04	+ 32
22	-3.06	- 042	+ 39	+ 84	+ 41	- 0.19	- 078	+ 08	+ 02	+ 43
23	-3.71	- 264	- 07	- 23	+ 129	+ 0.19	- 030	- 07	- 08	+ 12
24	-3.88	- 405	+ 14	- 13	+ 211	...	...	...	...	...
25	-1.68	- 406	+ 40	+ 11	+ 225	- 1.25	+ 012	- 10	- 09	- 11
26	-0.61	- 361	- 09	- 31	+ 177	+ 0.50	+ 094	- 21	- 14	- 58
27	...	...	...	...	...	+ 1.77	- 117	+ 55	+ 44	+ 87
28	-1.24	- 147	+ 37	+ 26	+ 93	+ 1.71	- 269	+ 18	00	+145
29	-0.88	- 064	+ 28	+ 22	+ 46	...	...	...	...	...
30	+0.02	- 131	+ 10	+ 01	+ 71	...	...	...	...	...
31	-1.18	- 092	+ 30	+ 22	+ 62	...	...	...	...	...
Absolute values	2° 12' 37"	3.48425	13.3730	13.8195	75° 23' 48"	2° 13' 30"	3.48258	13.8624	13.8088	75° 28' 32"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MARCH, 1861.						APRIL, 1861.					
Day of Month.	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	-1.22	-.00120	+.00053	+.00042	+ 87"	-0.40	+.00016	-.00008	-.00006	- 12"	
2	+1.95	- 006	- 03	- 03	+ 1	+0.99	+ 031	+ 04	+ 05	- 14	
3	...	...	...	...	...	+0.01	+ 050	- 07	- 03	- 29	
4	+1.00	+ 004	- 20	- 18	- 12	-0.26	+ 061	- 05	- 01	- 33	
5	+0.33	+ 065	- 35	- 29	- 50	+3.09	+ 103	- 05	+ 02	- 55	
6	+0.65	+ 010	- 31	- 28	- 20	-0.42	+ 045	+ 01	+ 04	- 22	
7	+0.09	+ 052	- 42	- 36	- 48	...	...	...	...	...
8	+0.37	+ 058	- 26	- 20	- 42	+0.06	- 061	+ 07	+ 03	+ 35	
9	+5.23	- 119	+ 04	- 04	+ 62	+0.08	- 045	+ 16	+ 12	+ 31	
10	...	...	...	...	...	-0.93	- 026	+ 11	+ 09	+ 19	
11	+4.83	- 232	- 46	- 58	+ 94	-0.73	+ 031	+ 06	+ 08	- 12	
12	+0.09	- 006	Imperfect			+0.39	- 010	+ 02	+ 01	+ 6	
13	-0.99	- 123	+ 23	+ 14	+ 74	+1.35	+ 001	+ 05	+ 05	+ 2	
14	+1.81	- 054	+ 04	+ 01	+ 29	...	...	...	...	...
15	-0.19	+ 003	+ 29	+ 27	+ 13	-0.28	- 030	+ 54	+ 49	+ 42	
16	+0.08	- 026	+ 29	+ 25	+ 28	-0.03	- 127	+ 05	- 04	+ 66	
17	...	...	...	...	...	-0.76	- 058	- 02	- 06	+ 28	
18	+1.60	- 014	- 21	- 20	- 4	-0.03	+ 022	00	+ 01	- 11	
19	-0.19	- 017	+ 14	+ 12	+ 16	+0.04	+ 013	+ 01	+ 01	- 6	
20	-2.24	- 003	- 01	- 01	+ 1	+2.87	- 002	- 08	- 08	- 3	
21	-0.13	+ 064	- 02	+ 02	- 34	...	...	...	...	...
22	-0.02	+ 137	- 05	+ 04	- 72	-0.09	+ 040	+ 55	+ 54	+ 7	
23	-1.47	- 034	- 17	- 18	+ 9	-1.47	- 051	+ 11	+ 07	+ 31	
24	...	...	...	...	...	+1.53	- 039	+ 09	+ 06	+ 24	
25	+1.41	- 050	+ 77	+ 69	+ 64	-1.09	- 022	- 11	- 12	+ 5	
26	+0.68	- 112	+ 30	+ 21	+ 71	-1.90	- 009	- 10	- 10	0	
27	+1.01	- 028	+ 23	+ 19	+ 25	-0.32	+ 025	00	+ 01	- 13	
28	+0.64	- 010	+ 10	+ 09	+ 10	...	...	...	...	...
29	...	...	...	...	...	+2.22	+ 044	- 16	- 12	- 30	
30	-1.07	+ 030	- 01	+ 01	- 16	+0.53	+ 062	- 06	- 02	- 34	
31	...	...	...	...	...	...	...	...	...	...
Absolute values } 2° 13' 24" 3.48286 13.3757 13.8217 75° 24' 18"						2° 14' 22" 3.47875 13.3758 13.8208 75° 25' 18"					

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MAY, 1861.						JUNE, 1861.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0.24	+ .00020	.00000	+ .00001	— 10"	0.27	+ .00085	— .00006	.00000	— 46"
2	+0.78	+ 012	+ 04	+ 04	— 4	...	...	...	...	...
3	—0.87	+ 017	+ 07	+ 07	— 5	—0.46	+ 102	+ 03	+ 10	— 49
4	—0.47	+ 125	— 05	+ 03	— 66	+1.88	+ 046	— 16	— 12	— 81
5	...	...	...	...	...	+0.83	+ 017	— 11	— 09	— 14
6	—0.45	+ 001	+ 09	+ 08	+ 4	—2.05	+ 026	— 11	— 09	— 19
7	+0.64	— 027	+ 04	+ 02	+ 16	—0.94	+ 080	+ 03	+ 08	— 39
8	—1.86	+ 015	+ 17	+ 17	+ 1	+0.10	— 001	— 05	— 05	— 2
9	—1.41	— 024	+ 04	+ 02	+ 14	...	...	...	...	...
10	—0.87	— 059	+ 08	+ 04	+ 34	—0.97	+ 002	— 15	— 14	— 9
11	+0.78	— 011	— 02	— 02	+ 5	—1.20	+ 071	+ 02	+ 06	— 35
12	...	...	...	...	...	—0.23	+ 063	— 18	— 12	— 40
13	+1.25	+ 053	— 06	— 02	— 30	+0.19	— 205	+ 12	— 02	+109
14	+1.65	— 016	+ 02	+ 01	+ 9	+0.73	— 133	— 12	— 19	+ 61
15	+1.37	+ 083	— 17	— 11	— 50	—0.61	— 100	+ 17	+ 09	+ 59
16	—0.22	— 079	00	— 05	+ 40	...	...	...	...	...
17	—0.94	— 053	— 10	— 12	+ 22	—0.55	— 041	— 02	— 04	+ 20
18	+0.78	— 072	+ 15	+ 10	+ 44	—0.16	+ 008	+ 06	+ 06	— 1
19	...	...	...	...	...	+0.17	— 043	+ 27	+ 23	+ 35
20	—0.16	— 035	+ 15	+ 12	+ 25	+0.79	— 035	+ 17	+ 14	+ 26
21	—1.25	— 042	+ 09	+ 06	+ 26	+0.71	+ 051	+ 15	+ 17	— 18
22	+1.73	— 004	+ 02	+ 02	+ 3	+0.61	+ 023	+ 09	+ 10	— 7
23	+1.14	— 041	— 31	— 32	+ 5	...	...	...	...	...
24	—1.47	+ 100	+ 01	+ 07	+ 50	—0.27	— 025	+ 07	+ 05	+ 16
25	+0.32	— 006	+ 04	+ 03	+ 5	+1.47	— 032	+ 07	+ 05	+ 20
26	...	...	...	...	...	+0.60	— 024	— 25	— 25	— 1
27	+2.83	— 073	— 27	— 30	+ 23	—0.51	— 014	00	— 01	+ 7
28	+0.66	— 084	— 06	— 11	+ 40	+0.25	— 060	— 17	— 20	+ 22
29	—0.71	— 014	— 12	— 12	+ 1	—0.15	— 007	— 15	— 14	— 4
30	—0.32	— 028	— 08	— 09	+ 10	...	...	...	...	...
31	—0.35	+ 024	— 25	— 22	— 24	...	...	...	...	...
Absolute values	2° 18' 17"	3.49884	13.4376	13.8856	75° 24' 20"	2° 13' 93"	3.48359	13.8641	13.8107	75° 23' 24"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JULY, 1861.						AUGUST, 1861.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	-0'.65	+.00049	-.00005	-.00001	- 27"	+1'.01	-.00002	+.00022	+.00020	+ 12"
2	-0.17	+ 038	- 05	- 02	- 22	-0.56	+ 082	+ 40	+ 42	- 21
3	-0.05	+ 071	+ 02	+ 06	- 35	+1.73	- 035	+ 15	+ 12	+ 25
4	-0.05	+ 029	+ 01	+ 03	- 14	...	...	...	...	...
5	+0.60	- 014	+ 04	+ 03	+ 9	+0.32	+ 017	- 06	- 04	- 12
6	-1.16	+ 011	+ 15	+ 15	+ 2	+2.07	- 051	- 01	- 04	+ 26
7	...	...	...	...	..	+0.89	+ 026	- 06	- 04	- 16
8	-2.12	+ 040	- 09	- 06	- 25	-4.06	+ 041	+ 03	+ 05	- 19
9	+1.07	+ 064	- 03	+ 01	- 34	+3.53	- 052	- 20	- 22	+ 16
10	-0.17	+ 024	+ 22	+ 22	- 1	-0.53	+ 034	+ 15	+ 16	- 10
11	-1.63	- 100	+ 01	- 05	+ 51	...	...	...	...	...
12	-0.91	- 067	+ 05	+ 01	+ 36	-0.50	+ 074	+ 09	+ 13	- 33
13	+0.38	- 006	- 15	- 15	- 4	-0.53	+ 029	- 10	- 08	- 20
14	...	...	...	...	..	+2.55	- 041	- 12	- 14	+ 15
15	+2.24	- 061	- 09	- 12	+ 26	+2.76	- 007	- 36	- 34	- 15
16	-0.44	+ 003	+ 01	+ 01	- 1	+1.30	+ 014	- 15	- 14	- 15
17	+0.06	- 055	+ 17	+ 12	+ 36	-0.67	+ 019	- 30	- 27	- 24
18	+1.28	+ 035	+ 06	+ 07	- 15	...	...	...	...	...
19	+0.50	+ 022	- 08	- 06	- 15	+0.26	- 250	- 50	- 63	+101
20	+0.46	+ 105	+ 14	+ 20	- 46	+1.00	- 049	+ 04	00	+ 27
21	...	...	...	...	...	+3.09	- 053	- 08	- 11	+ 23
22	-1.41	+ 011				+1.49	- 118	- 23	- 29	+ 48
23	-0.69	+ 002	+ 29	+ 27	+ 13	+0.45	- 069	- 17	- 20	+ 26
24	+1.03	- 022	+ 55	+ 50	+ 39	-0.62	- 039	00	- 03	+ 19
25	+1.45	- 030	+ 25	+ 22	+ 28	...	...	...	...	...
26	+1.04	- 070	+ 20	+ 14	+ 45	-0.55	- 003	- 04	- 04	- 1
27	+0.08	- 028	+ 34	+ 30	+ 31	-0.58	+ 001	- 12	- 12	- 7
28	...	...	...	...	...	-0.87	+ 012	- 07	- 06	- 9
29	-1.18	- 005	+ 20	+ 18	+ 13	+0.12	- 003	- 09	- 08	- 3
30	+0.32	+ 008	+ 07	+ 07	- 1	-0.69	+ 028	- 10	- 08	- 19
31	-0.52	+ 020	+ 22	+ 21	+ 1	-0.04	+ 004	- 16	- 15	- 10
Absolute values } 2° 14'.10 3.48721 13.3711 13.8185 75° 22' 58"						2° 14'.71 3.48465 13.3730 13.8195 75° 23' 42"				

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

SEPTEMBER, 1861.						OCTOBER, 1861.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	...	...	...	...	...	+0.99	+ .00021	-.00006	-.00004	- 13"
2	+ 2.52	+ .00005	-.00012	-.00011	- 9"	+0.82	- 034	- 08	- 10	+ 13
3	+ 1.31	- 024	+ 06	+ 05	+ 15	+0.91	- 016	+ 03	+ 02	+ 9
4	- 2.61	- 021	- 02	- 03	+ 10	+0.60	+ 012	- 06	- 05	- 9
5	+ 1.25	- 035	+ 11	+ 08	+ 23	+1.35	+ 002	- 01	- 01	- 2
6	+ 1.91	- 044	+ 04	+ 01	+ 24	...	...	...	...	...
7	- 0.19	- 035	+ 13	+ 10	+ 24	+0.25	+ 052	- 04	00	- 28
8	...	...	...	...	...	-0.20	+ 035	- 15	- 12	- 25
9	- 0.83	- 014	+ 11	+ 09	+ 13	-0.04	+ 016	- 06	- 05	- 11
10	- 0.12	+ 031	+ 03	+ 05	- 14	+0.19	- 493	- 60	- 88	+218
11	- 0.05	+ 027	- 03	- 01	- 15	+0.12	- 169	+ 20	+ 08	+ 95
12	+ 0.63	+ 035	- 10	- 07	- 23	+0.57	- 100	- 22	- 27	+ 39
13	+ 0.88	+ 034	- 10	- 07	- 22	...	...	...	...	...
14	+ 1.45	+ 038	- 10	- 07	- 24	-1.61	- 102	- 04	- 10	+ 50
15	...	...	...	...	...	-0.65	- 027	- 12	- 13	+ 8
16	+ 1.35	- 204	+ 01	- 12	+ 104	-0.96	- 031	- 05	- 07	+ 13
17	+ 1.45	- 061	+ 32	+ 26	+ 47	+0.64	- 036	+ 02	- 01	+ 19
18	+ 0.43	- 098	+ 18	+ 11	+ 59	0.00	- 015	- 02	- 03	+ 6
19	+ 0.31	- 178	+ 01	- 10	+ 90	+0.90	+ 021	+ 04	+ 05	- 8
20	- 1.06	- 084	- 05	- 10	+ 40	...	...	...	...	...
21	- 1.03	+ 035	+ 06	+ 08	- 14	+0.04	+ 039	+ 08	+ 10	- 15
22	...	...	...	...	...	-0.54	+ 047	- 03	00	- 25
23	- 0.14	+ 067	+ 13	+ 17	- 27	+0.25	+ 011	+ 08	+ 09	- 2
24	+ 0.60	+ 011	+ 03	+ 04	- 4	-8.22	- 378	- 54	- 74	+163
25	- 1.20	- 001	+ 01	+ 01	+ 1	-0.74	- 156	+ 34	+ 22	+ 96
26	- 0.50	- 003	+ 01	+ 01	+ 2	+0.09	- 070	+ 27	+ 21	+ 49
27	+ 0.19	+ 020	- 03	- 02	- 12	...	...	...	...	...
28	- 0.24	+ 063	- 19	- 14	- 41	-1.50	+ 038	+ 21	+ 22	- 9
29	...	...	...	...	...	-0.71	+ 014	+ 05	+ 05	- 5
30	- 0.40	+ 096	- 06	00	- 51	-0.30	+ 014	- 02	- 01	- 8
31	...	...	...	...	...	-0.85	+ 045	- 08	- 04	- 27
Absolute values }	2° 15'.23	3.47959	13.3467	13.7928	75° 23' 16"	2° 15'.04	3.48175	13.3635	13.8096	75° 23' 48"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

NOVEMBER, 1861.						DECEMBER, 1861.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0.84	+ .00003	+ .00011	+ .00011	+ 4"	...	...	...	...	...
2	-0.76	- 043	+ 12	+ 08	+ 28	-0.35	+ .00016	+ .00014	+ .00014	- 1"
3	...	...	...	...	..	+0.17	+ 067	+ 11	+ 14	- 28
4	+1.14	+ 049	+ 06	+ 09	- 21	+1.95	- 058	+ 46	+ 39	+ 52
5	+0.30	+ 054	+ 08	+ 11	- 23	-1.61	- 143	00	- 09	+ 72
6	+0.38	+ 041	00	+ 02	- 21	+1.95	- 194	+ 42	+ 26	+119
7	-1.09	- 204	+ 13	- 01	+ 109	+0.46	- 036	+ 18	+ 15	+ 27
8	-0.17	- 172	+ 37	+ 24	+ 106	...	...	...	...	...
9	+1.29	- 066	+ 13	+ 08	+ 40	+2.87	- 097	- 16	- 22	+ 40
10	...	...	...	...	...	-2.69	- 182	- 10	- 21	+ 87
11	+1.29	- 025	- 02	- 03	+ 12	-0.78	- 056	+ 05	+ 01	+ 31
12	-0.05	- 044	+ 06	+ 03	+ 25	+0.23	- 027	+ 02	00	+ 15
13	+0.69	- 014	+ 02	+ 01	+ 8	-0.39	+ 001	+ 02	+ 02	00
14	-0.64	- 044	00	- 03	+ 22	-0.04	+ 016	+ 01	+ 02	- 7
15	+0.53	- 050	- 18	- 20	+ 16	...	...	...	...	...
16	-0.30	+ 001	- 14	- 13	- 8	+0.87	+ 067	- 11	- 06	- 40
17	...	...	...	...	...	-0.46	+ 008	+ 06	+ 06	- 1
18	+1.93	- 068	- 09	- 12	+ 30	+0.21	- 046	- 05	- 08	+ 21
19	-2.07	- 031	- 19	- 20	+ 6	-1.82	- 159	+ 17	+ 05	+ 89
20	-0.04	- 019	+ 03	+ 01	+ 11	-1.50	- 087	+ 77	+ 66	+ 82
21	+0.55	+ 030	- 07	- 05	- 19	-0.68	- 097	+ 07	00	+ 52
22	-0.10	+ 027	- 06	- 04	- 17	...	...	...	...	...
23	-1.05	- 058	- 02	- 03	+ 28	-0.40	- 018	+ 06	+ 04	+ 12
24	...	...	...	...	...	+0.12	- 022	- 07	- 08	+ 8
25	+0.27	- 057	+ 02	- 02	+ 29	...	...	...	...	...
26	-1.04	- 028	- 16	- 17	+ 6	-0.03	+ 095	- 15	- 08	- 55
27	-0.39	+ 002	- 05	- 05	- 4	-0.24	+ 028	- 10	- 08	- 19
28	-0.44	+ 021	- 04	- 02	- 12	-0.28	+ 032	- 21	- 18	- 27
29	-0.21	- 005	- 32	- 30	- 13	...	...	...	...	...
30	-1.45	+ 013	- 36	- 32	- 25	+0.37	+ 048	- 17	- 13	- 33
31	...	...	...	...	...	+0.73	+ 060	- 22	- 17	- 42
Absolute values }	2° 15' 69	3.48221	13.3583	13.8048	75° 23' 22"	2° 17' 24	3.48038	13.3495	13.7957	75° 23' 16"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JANUARY, 1862.						FEBRUARY, 1862.				
Day of Month.	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0.05	-.00015	+.00024	+.00021	+ 19"	- 1.59	+.00030	-.00008	-.00005	- 19"
2	+1.19	+ 026	- 01	+ 01	- 14	...	...	...	...	...
3	+0.66	- 020	- 05	- 06	+ 08	- 0.40	- 002	- 12	- 12	- 5
4	-0.06	+ 018	- 08	- 06	- 13	+ 0.05	+ 003	+ 06	+ 06	+ 1
5	...	...	...	...	...	+ 0.05	+ 046	- 05	- 02	- 26
6	+0.16	+ 042	- 08	- 05	- 25	+ 0.63	- 028	- 01	- 02	+ 13
7	-0.83	+ 017	- 01	00	- 9	+ 0.22	- 073	+ 06	+ 01	+ 40
8	+0.17	+ 044	+ 01	+ 04	- 21	- 0.82	- 025	+ 09	+ 07	+ 17
9	-0.59	+ 030	+ 12	+ 13	- 9	...	...	...	...	...
10	+0.32	+ 008	+ 06	+ 06	- 1	- 0.42	- 008	- 02	- 03	+ 8
11	+0.14	- 027	+ 06	+ 04	+ 17	+ 0.52	+ 011	+ 03	+ 03	- 4
12	...	...	...	...	...	- 0.15	+ 022	+ 04	+ 05	- 9
13	-0.61	- 086	00	- 05	+ 44	- 0.80	- 036	- 01	- 04	+ 17
14	-1.45	- 143	- 06	- 14	+ 69	- 0.30	- 018	+ 01	00	+ 9
15	+2.21	- 218	+ 84	+ 64	+ 152	- 0.37	- 002	- 06	- 06	- 2
16	-0.53	- 161	+ 09	- 02	+ 85	...	...	...	...	...
17	-0.01	- 064	+ 02	- 02	+ 33	- 0.03	+ 028	- 08	- 06	- 18
18	-0.49	- 006	+ 02	+ 02	+ 4	+ 0.48	+ 043	+ 02	+ 05	- 20
19	...	...	...	...	...	+ 1.78	- 008	- 08	- 03	0
20	+0.17	+ 030	- 03	00	- 16	+ 1.02	- 068	+ 09	+ 04	+ 39
21	+2.52	- 029	+ 27	+ 24	+ 28	+ 0.69	- 096	+ 30	+ 22	+ 63
22	+1.26	- 165	- 20	- 29	+ 78	- 0.65	- 137	+ 20	+ 10	+ 79
23	-0.05	- 069	+ 14	+ 09	+ 42	...	...	...	...	...
24	-0.41	+ 015	+ 09	+ 10	- 3	+ 0.21	- 032	- 06	- 08	+ 13
25	-0.25	- 025	- 11	- 12	+ 7	- 0.10	+ 033	+ 07	+ 09	- 13
26	...	...	...	...	...	+ 0.30	+ 043	- 08	00	- 23
27	-0.72	+ 019	- 07	- 05	- 13	+ 0.55	+ 080	- 11	- 06	- 46
28	+0.06	+ 034	- 21	- 17	- 28	+ 1.07	- 150	+ 02	- 07	+ 77
29	+0.72	+ 082	+ 01	+ 06	- 41	...	...	...	...	...
30	-0.45	+ 025	- 17	- 15	- 21	...	...	...	...	...
31	-0.67	+ 012	+ 02	+ 02	- 5	...	...	...	...	...
Absolute values	2° 15'.71	3.48389	13.3605	13.8073	75° 23' 06"	2° 11'.99	3.48337	13.3628	13.8093	75° 23' 22"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MARCH, 1862.						APRIL, 1862.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+0.65	-.00004	+.00013	+.00012	+ 8"	-0.15	+.00041	+.00010	+.00012	- 16"
2	...	...	...	...	...	-2.35	- 103	+ 16	+ 09	+ 60
3	-0.13	+ 002	- 04	- 04	- 3	-1.17	- 117	+ 20	+ 11	+ 69
4	+1.14	+ 021	+ 03	+ 04	- 9	+0.28	- 128	- 01	- 09	+ 64
5	+0.57	+ 070	- 05	00	- 38	-0.52	- 034	+ 14	+ 11	+ 24
6	-0.90	- 215	- 13	- 26	+ 102	...	...	...	...	...
7	-0.58	- 144	+ 29	+ 18	+ 87	-0.24	+ 017	+ 10	+ 10	- 4
8	+0.21	- 054	+ 20	+ 16	+ 38	-0.21	+ 027	- 04	- 02	- 16
9	...	...	...	...	...	+0.35	+ 031	+ 03	+ 05	- 14
10	-0.25	- 015	+ 14	+ 12	+ 15	+3.68	- 085	- 19	- 23	+ 34
11	+0.16	- 006	+ 07	+ 06	+ 6	+0.65	- 133	- 06	- 14	+ 64
12	+0.68	- 057	+ 15	+ 10	+ 36	+0.71	- 065	+ 16	+ 11	+ 41
13	+0.59	+ 004	- 04	- 04	- 4	...	...	...	...	...
14	+0.07	+ 018	+ 09	+ 09	- 5	+0.35	+ 014	+ 15	+ 15	+ 1
15	-1.39	+ 026	- 04	- 02	- 15	+3.41	+ 040	+ 21	+ 22	- 10
16	...	...	...	...	...	-2.44	- 057	- 24	- 26	+ 17
17	+4.02	+ 035	- 15	- 12	- 25	-0.19	- 018	+ 06	+ 04	+ 12
18	-1.16	+ 027	+ 11	+ 12	- 8	...	...	...	...	...
19	-4.24	- 066	- 24	- 27	+ 21	-0.42	+ 043	- 03	00	- 23
20	-0.63	- 047	- 11	- 14	+ 18	...	...	...	...	...
21	-1.55	- 020	- 02	- 04	+ 9	+1.86	+ 029	- 11	- 08	- 20
22	+0.35	+ 004	+ 02	+ 02	- 1	-0.51	- 018	- 14	- 14	+ 2
23	...	...	...	...	...	+0.78	+ 047	+ 08	+ 10	- 20
24	-0.45	+ 064	- 30	- 24	- 48	-0.08	- 003	- 12	- 11	- 4
25	+0.17	+ 054	- 10	- 06	- 32	-0.21	- 042	- 10	- 12	+ 16
26	-0.67	+ 019	+ 01	+ 02	- 9	-0.33	+ 039	- 16	- 13	- 28
27	+0.82	+ 014	- 07	- 06	- 11	...	...	...	...	...
28	+0.29	- 001	- 10	- 10	- 5	-0.46	- 015	+ 09	+ 08	+ 12
29	+0.18	- 004	- 14	- 13	- 5	-0.10	+ 010	+ 09	+ 09	- 1
30	...	...	...	...	...	-0.80	+ 008	+ 02	+ 03	- 3
31	-0.21	+ 038	- 13	- 08	- 41	...	...	...	...	...
Absolute values } 2° 13' .91 3.48458 13.3714 13.8180 75° 23' 37"						2° 13' .77 3.49216 13.3864 13.8344 75° 22' 44"				

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

MAY, 1862.						JUNE, 1862.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	-1.12	+ .00010	+ .00018	+ .00018	+ 4"	...	...	...	...	...
2	-0.16	+ 025	- 01	+ 01	- 13	+0.09	-.00015	+ .00026	+ .00023	+ 21"
3	+0.32	+ 018	+ 04	+ 04	- 7	-0.59	- 004	+ 20	+ 19	+ 12
4	...	...	...	...	...	-0.57	- 053	+ 16	+ 12	+ 35
5	+2.10	- 011	- 01	- 01	+ 5	-0.19	- 007	+ 08	+ 07	+ 8
6	-2.92	- 059	- 38	- 39	+ 11	-0.76	- 007	+ 10	+ 09	+ 9
7	-1.09	- 040	+ 22	+ 18	+ 31	-0.52	- 019	+ 05	+ 04	+ 12
8	-0.41	+ 026	- 26	- 22	- 26	...	...	...	...	...
9	+0.30	+ 040	00	+ 02	- 20	-0.55	+ 057	- 04	00	- 31
10	+0.76	+ 015	- 16	- 14	- 16	+0.42	+ 056	+ 06	+ 10	- 25
11	...	...	...	...	...	+1.66	+ 036	- 10	- 07	- 23
12	-1.67	+ 062	- 11	- 07	- 37	-0.17	+ 019	+ 11	+ 12	- 4
13	-0.22	- 002	+ 02	+ 02	+ 2	+1.15	- 008	- 27	- 26	- 10
14	-1.49	+ 052	+ 05	+ 08	- 24	-0.58	- 033	- 24	- 25	+ 4
15	+0.51	- 057	+ 06	+ 02	+ 32	...	...	...	...	...
16	-0.64	- 018	- 14	- 14	+ 2	+1.75	+ 005	+ 04	+ 04	0
17	+1.37	- 057	+ 06	+ 02	+ 32	+0.40	- 018	- 16	- 16	+ 1
18	...	...	...	...	...	-0.28	+ 015	- 01	00	- 8
19	-1.18	+ 011	+ 29	+ 28	+ 9	-0.35	+ 037	- 19	- 15	- 28
20	+1.79	- 101	- 01	- 07	+ 50	+1.30	- 078	- 05	- 09	+ 37
21	+2.20	- 031	+ 02	00	+ 16	-0.42	- 001	- 12	- 11	- 6
22	+0.24	+ 018	- 05	- 04	- 12	...	...	...	...	...
23	+1.46	+ 058	+ 03	+ 06	- 28	-1.36	- 005	- 20	- 19	- 7
24	+1.05	- 012	+ 03	+ 02	+ 8	+1.32	+ 015	+ 07	+ 08	- 4
25	...	...	...	...	...	-1.17	- 034	- 21	- 22	+ 6
26	-0.93	- 006	+ 03	+ 02	+ 5	-0.71	+ 018	- 04	- 02	- 11
27	-0.21	- 031	- 05	- 06	+ 13	+0.50	- 003	- 19	- 18	- 8
28	+0.12	+ 028	- 12	- 10	- 21	-0.37	+ 180	- 31	- 18	-106
29	-0.23	+ 078	00	+ 05	- 39	...	...	...	...	...
30	-2.69	- 111	- 68	- 69	+ 23	+1.16	- 062	00	- 04	+ 31
31	+0.27	- 113	+ 29	+ 20	+ 71	...	...	...	...	...
Absolute values	2° 14'.44	3.48674	13.3752	13.8222	75° 23' 20"	2° 16'.73	3.48824	13.3719	13.8194	75° 22' 46"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

JULY, 1862.						AUGUST, 1862.					
Day of Month.	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\Psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	
1	+0.45	+ .00092	-.00005	+.00001	- 49"	+2.83	+.00015	-.00007	-.00006	- 11"	
2	-0.93	+ 055	+ 16	+ 19	- 20	+2.95	+ 054	+ 08	+ 11	- 23	
3	-0.58	+ 077	- 04	+ 02	- 41	...	...	...	...	...
4	-0.68	+ 069	+ 02	+ 06	- 34	+1.30	- 249	- 17	- 32	+117	
5	+0.70	+ 189	+ 69	+ 76	- 61	-4.95	- 423	- 53	- 77	+186	
6	...	...	...	...	...	-2.38	- 217	- 13	- 26	+103
7	+1.29	- 130	+ 07	- 02	+ 69	+3.78	- 150	- 06	- 15	+ 73	
8	+0.07	- 087	+ 50	+ 42	+ 69	+2.20	- 085	+ 18	+ 12	+ 52	
9	-0.09	- 151	- 14	- 23	+ 69	+1.21	- 104	+ 06	- 01	+ 55	
10	+1.51	- 077	+ 22	+ 15	+ 50	...	...	...	...	...
11	+1.35	- 097	00	- 06	+ 49	-0.79	- 024	+ 14	+ 12	+ 19	
12	-1.52	- 069	+ 22	+ 16	+ 46	-0.59	+ 004	- 06	- 05	- 5	
13	...	...	...	...	...	+2.95	+ 054	- 23	- 18	- 89
14	+0.17	- 075	- 06	- 10	+ 35	-0.86	+ 017	+ 31	+ 30	+ 7	
15	+1.33	+ 035	- 04	- 01	- 20	-0.50	+ 014	- 05	- 04	- 10	
16	-0.38	- 033	+ 15	+ 12	+ 24	-0.84	+ 022	- 11	- 09	- 17	
17	+1.18	+ 002	- 05	- 04	- 3	...	...	...	...	...
18	-0.36	+ 038	+ 06	+ 08	- 16	+1.51	+ 015	+ 02	+ 02	- 7	
19	-1.04	+ 027	- 03	- 01	- 15	+2.59	- 070	- 21	- 24	+ 24	
20	...	...	...	...	...	+0.02	- 089	+ 01	- 05	+ 45
21	+0.05	+ 077	- 04	+ 01	- 41	-1.43	- 047	+ 01	- 02	+ 24	
22	-0.32	+ 050	- 13	- 09	- 32	-1.25	+ 021	- 03	- 01	- 12	
23	+3.61	+ 020	+ 42	+ 41	+ 11	+1.52	- 008	- 04	- 04	+ 2	
24	-0.17	+ 044	+ 02	+ 04	- 21	...	...	...	...	...
25	-0.22	- 032	+ 10	+ 07	+ 21	-1.47	+ 052	- 19	- 14	- 36	
26	+1.18	- 049	+ 03	00	+ 26	-0.12	+ 023	+ 09	+ 10	- 7	
27	...	...	...	...	...	-1.17	+ 071	- 30	- 23	- 51
28	-0.12	+ 003	- 06	- 05	- 4	+3.13	+ 020	- 31	- 28	- 26	
29	+2.32	- 048	- 01	- 04	+ 23	-0.83	+ 011	- 16	- 14	- 14	
30	+1.25	+ 026	+ 04	+ 05	- 11	-1.26	- 130	- 44	- 49	+ 43	
31	-1.17	+ 015	- 11	- 09	- 13	...	...	...	...	...
Absolute values }	2° 16' 22	3.48695	13.3691	13.8163	75° 22' 54"	2° 15' 91	3.48393	13.3716	13.8180	75° 23' 47"	

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

SEPTEMBER, 1862.						OCTOBER, 1862.				
Day of Month.	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	-1.47	+0.00016	+0.00005	+0.00006	- 5"	+2.16	.00000	+0.00002	+0.00002	+ 1"
2	-0.75	- 069	000	- 004	+ 35	+0.86	- 014	- 18	- 18	- 2
3	+2.53	- 054	+ 024	+ 019	+ 40	+1.33	- 089	+ 11	+ 04	+ 50
4	+0.85	- 142	- 011	- 020	+ 66	-4.65	- 278	+ 23	+ 04	+152
5	-0.50	- 081	+ 009	+ 003	+ 45	...	...	...	...	...
6	+0.99	+ 028	+ 014	+ 015	- 7	-5.40	- 437	- 04	- 31	+218
7	...	...	...	...	...	+6.95	- 042	+ 10	+ 07	+ 26
8	-1.41	+ 043	+ 014	+ 016	- 14	-0.85	- 034	+ 09	+ 07	+ 22
9	-0.60	- 094	- 020	- 025	+ 37	-0.80	- 040	+ 16	+ 13	+ 28
10	-3.54	- 091	- 016	- 021	+ 38	+1.83	- 146	- 26	- 34	+ 60
11	+0.06	- 012	+ 002	+ 001	+ 7	-0.74	- 126	- 38	- 44	+ 44
12	+1.63	+ 023	- 002	000	- 13	...	...	...	...	...
13	+0.37	- 008	- 008	- 008	0	+3.35	- 055	+ 01	00	+ 30
14	...	...	...	...	...	+0.61	- 059	+ 05	+ 01	+ 32
15	+0.24	+ 090	- 005	+ 001	- 48	-1.51	+ 029	+ 01	+ 03	- 14
16	+1.00	+ 044	- 112	- 102	- 79	-0.18	+ 057	- 05	- 01	- 31
17	+0.63	+ 025	- 012	- 010	- 19	-1.04	+ 030	+ 01	+ 03	- 14
18	-0.62	+ 091	+ 007	+ 012	- 42	+0.60	+ 126	+ 13	+ 20	- 57
19	-0.59	+ 013	- 005	- 004	- 9	...	...	...	...	...
20	-0.35	+ 063	+ 007	+ 010	- 28	+0.28	+ 095	00	+ 06	- 48
21	...	...	...	...	...	+0.88	+ 089	+ 01	+ 06	- 44
22	+1.12	+ 030	- 005	- 002	- 17	-6.95	- 358	+ 31	+ 06	+196
23	+1.52	- 010	- 015	- 015	- 3	-1.43	- 058	+ 09	+ 05	+ 34
24	-2.55	- 141	+ 024	+ 013	+ 83	+1.24	- 029	+ 16	+ 13	+ 23
25	-0.86	- 166	- 038	- 046	+ 65	+0.90	- 051	- 02	- 05	+ 24
26	-1.49	- 085	- 006	- 011	+ 40	...	...	...	...	...
27	-0.63	- 143	- 008	- 017	+ 68	-0.53	+ 045	+ 06	+ 08	- 20
28	...	...	...	...	...	-0.87	+ 090	00	+ 06	- 45
29	-2.15	- 048	- 005	- 008	+ 21	-0.94	+ 045	+ 12	+ 14	- 17
30	-0.01	- 016	- 005	- 005	+ 6	-5.04	- 117	+ 03	- 05	+ 61
31	...	...	...	...	...	-0.45	+ 067	- 02	+ 03	- 35
Absolute values	2° 17'.10	3.48402	13.8682	13.8147	75° 23' 33"	2° 17'.41	3.47925	13.8547	13.8004	75° 23' 51"

TABLE XLVIII.
ABNORMAL VARIATIONS OF SIX-HOUR DAILY MEANS.

Day of Month.	NOVEMBER, 1862.					DECEMBER, 1862.				
	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$	$\Delta\psi$	$\frac{\Delta X}{X}$	$\frac{\Delta Y}{Y}$	$\frac{\Delta\phi}{\phi}$	$\Delta\theta$
1	+1.41	-.00039	+.00014	+.00010	+ 37"	-0.50	-.00016	+.00014	+.00012	+ 15"
2	...	...	...	...	...	-2.17	+ 003	+ 01	+ 04	0
3	+0.03	+ 011	+ 22	+ 22	+ 6	+0.96	+ 060	+ 06	+ 09	- 27
4	-2.46	- 120	+ 21	+ 12	+ 71	+0.77	000	- 01	- 01	- 1
5	-0.22	- 103	+ 01	- 06	+ 53	+0.60	- 005	+ 19	+ 18	+ 12
6	+1.17	- 018	- 12	- 13	+ 3	-1.14	- 009	- 09	- 09	0
7	+0.50	- 022	- 09	- 10	+ 7	...	...	...	...	...
8	+0.24	+ 033	- 09	- 05	- 31	+0.12	- 013	- 23	- 22	- 5
9	...	...	...	...	...	+0.03	+ 006	- 02	- 02	- 4
10	-1.29	+ 006	- 07	- 06	- 7	+0.61	+ 030	+ 01	+ 03	- 15
11	-0.58	- 013	+ 21	+ 19	+ 17	+0.18	+ 058	- 04	00	- 31
12	-0.33	+ 021	+ 06	+ 07	- 8	+0.28	+ 018	- 04	- 02	- 11
13	+0.14	+ 067	00	+ 04	- 34	+2.84	+ 071	+ 01	+ 06	- 35
14	-0.13	+ 001	+ 13	+ 12	+ 6	...	...	...	...	...
15	-1.09	- 002	- 10	- 01	- 4	+0.01	- 199	+ 36	+ 21	+119
16	...	...	...	...	...	-0.53	- 154	+ 10	- 01	+ 82
17	+1.49	- 035	- 03	- 05	+ 16	-1.39	- 141	+ 13	+ 03	+ 77
18	+0.53	- 130	- 01	- 10	+ 65	-0.02	- 089	- 03	- 09	+ 43
19	+0.14	- 085	+ 21	+ 14	+ 53	-0.44	- 068	+ 08	+ 03	+ 36
20	+0.42	- 005	- 05	- 05	0	-0.61	- 057	- 04	- 08	- 27
21	-0.46	- 006	00	- 01	+ 3	...	...	...	...	...
22	-0.44	- 064	- 04	- 08	+ 30	+0.68	- 016	- 21	- 21	- 3
23	...	...	...	...	...	-2.09	- 025	- 23	- 23	+ 1
24	-0.98	+ 034	- 10	- 07	- 22	-2.76	- 163	- 02	- 13	- 51
25	-0.30	+ 044	- 02	+ 01	- 23	...	...	...	...	...
26	+0.58	+ 029	- 01	+ 01	- 15	-6.57	- 142	- 17	- 24	+ 63
27	-0.87	- 085	+ 14	+ 07	+ 50	+0.05	- 045	- 20	+ 16	+ 33
28	-0.33	- 038	- 07	- 07	+ 1	...	...	...	...	...
29	-0.44	+ 027	- 01	+ 01	- 4	+0.63	+ 035	- 04	- 01	- 19
30	...	...	...	...	...	-0.55	+ 073	- 21	- 15	- 48
31	...	...	...	...	...	-0.57	+ 036	- 26	- 20	- 46
Absolute values	2 17.59	8.48194	18.8465	18.7952	75° 22' 49"	2 17.18	8.48890	18.8691	18.8165	75° 22' 25"

TABLE XLIX.

DATES (ASTRONOMICAL TIME) AT WHICH UNUSUALLY LARGE DISTURBANCES OCCURRED AT THE ORDINARY OBSERVATION HOURS, WITH THE AMOUNT OF ABNORMAL VARIATION OF EACH SUCH DISTURBANCE.

DECLINATION—Abnormal variation not less than 15'. The sign (+) indicates an easterly disturbance, and (–) a westerly disturbance.

DATE.	Amount	DATE.	Amount	DATE.	Amount	DATE.	Amount	DATE.	Amount	DATE.	Amount
1853. D. H. July 13 10	+44.1	1856. D. H. August 23 10	+19.0	1859. D. H. Jan. 19 10	+19.8	1859. D. H. Dec. 6 10	+33.4	1860. D. H. Aug. 18 12	+25.2	1862. D. H. Jan. 15 12	+21.3
August 13 12	+15.3	Sept. 8 10	+18.2	Feb. 9 12	+21.0	" 13 2	–15.5	" 23 10	+18.7	Mar. 18 20	–18.9
Sept. 1 10	+30.7	1857. May 7 10	–35.1	" 23 18	–19.9	" 14 10	+15.3	Sept. 6 10	–31.6	April 15 10	+17.3
" 2 10	+20.7	" 7 12	–34.6	" 23 20	–23.8	" 14 12	+22.5	" 6 12	–50.7	" 21 10	+19.1
" 27 20	–20.4	August 12 10	+17.1	March 16 10	+30.1	1860. Feb. 18 10	+18.6	" 30 18	+15.8	May 21 2	+16.8
October 31 4	–31.8	Sept. 23 10	+15.8	April 28 20	–15.4	" 20 18	–16.8	Oct. 2 18	–17.6	Aug. 4 12	–23.5
Novemr. 9 12	+16.3	Oct. 17 10	+18.6	" 29 2	+21.8	March 27 18	–18.9	" 2 20	–21.2	" 4 18	–30.5
Decr. 6 10	+15.1	Dec. 16 18	–72.0	May 18 20	+23.0	" 28 12	–17.0	Dec. 10 10	+15.4	" 28 10	+22.9
" 16 12	+15.1	1858. Jan. 8 18	–20.5	July 2 2	+16.3	" 29 2	+20.7	1861. Jan. 23 20	–32.1	" 29 20	–15.3
1854. Feb. 24 4	–18.9	March 2 12	+17.8	" 17 20	–15.2	April 9 12	–16.0	" 24 20	–18.8	Sept. 9 10	+18.0
" 27 10	+25.3	" 13 12	+18.5	" 18 12	+16.6	May 5 12	+23.0	" 25 18	–15.4	Oct. 3 20	–27.5
" 28 12	+18.1	" 13 12	+15.8	Sept. 1 12	–80.9	" 17 2	–20.7	" 26 12	+17.7	" 5 18	–25.3
March 15 10	+16.2	" 31 10	+16.2	" 1 20	+27.7	June 30 10	+21.7	March 9 10	+26.4	" 5 20	–31.5
" 27 10	+16.1	May 21 18	+16.1	" 2 2	+18.1	July 2 10	+23.0	April 14 20	–21.5	" 21 18	–32.5
" 27 20	–15.1	Sept. 7 10	+18.1	" 2 18	–20.9	" 4 20	–23.4	" 20 10	+18.9	" 29 20	–17.6
April 10 10	+43.7	" 23 18	+17.3	" 2 20	+19.8	" 5 4	+17.5	July 10 18	–15.8	Nov. 2 20	–17.1
" 10 12	–48.1	Oct. 27 10	+23.0	" 3 10	+18.7	" 19 10	–17.4	Aug. 18 20	–18.6	Dec. 23 20	–24.1
" 10 18	–22.1	" 29 18	+19.7	" 4 18	–16.6	August 7 20	–44.7	Oct. 9 20	–26.4	" 25 18	–22.2
" 23 20	–18.6	Dec. 12 20	–26.7	Oct. 17 18	–16.7	" 12 18	–27.8	" 24 12	–29.7		
1855. October 4 10	+16.3	" 22 12	+20.4	" 20 18	–17.4	" 12 20	–23.2	Dec. 9 18	–19.7		
				" 20 20	–26.6	" 13 2	+15.9	...	...

TABLE L.

TOTAL FORCE.—Abnormal Variation not less than .001 of the total force.

1853. D. H.	.00	1853. D. H.	.00	1854. D. H.	.00	1854. D. H.	.00	1854. D. H.	.00	1857. D. H.	.00
July 13 4	+ 100	Sept. 16 12	+ 100	March 15 12	– 261	April 23 20	– 122	Aug. 23 10	– 121	Dec. 16 18	– 761
" 13 10	– 212	" 26 18	– 112	" 16 2	+ 104	" 24 2	+ 164	" 23 12	– 126	" 27 18	– 171
" 13 12	– 249	" 27 18	– 184	" 16 4	+ 227	" 29 10	– 107	Oct. 4 12	– 419		
" 21 18	– 112	" 27 20	– 117	" 16 10	+ 103	May 15 2	+ 100			1856. Jan. 8 18	– 108
Aug. 22 12	– 101	Oct. 31 4	+ 475	" 16 12	+ 123	" 15 4	+ 120	1867. May 7 4	+ 212	Feb. 16 12	– 120
Sept. 1 10	– 189	Nov. 9 12	– 174	" 27 12	– 126	June 12 12	– 144	" 7 10	– 617	March 2 12	– 173
" 1 12	– 206	Dec. 6 4	+ 100	" 27 18	– 126	" 12 18	– 104	" 7 12	– 900	" 2 18	– 112
" 1 26	– 100	1854. Jan. 2 4	+ 177	" 27 20	– 215	1855. Sept. 27 12	– 143	July 10 12	– 105	" 12 12	– 121
" 2 4	+ 106	Feb. 10 4	+ 224	" 28 2	+ 284	Oct. 4 10	– 254	" 11 4	+ 101	" 12 4	+ 120
" 2 10	– 216	" 10 18	– 272	" 28 4	+ 220			Sept. 3 10	– 301	" 12 10	+ 122
" 2 12	– 220	" 10 20	– 107	April 10 10	– 408	1856. Feb. 7 20	+ 106	" 3 12	– 407	" 20 20	+ 124
" 2 18	– 183	" 24 4	+ 144	" 10 12	– 420	" 12 20	+ 118	Nov. 16 12	– 104	April 8 18	– 206
" 2 10	+ 125	" 24 18	– 106	" 23 12	– 121	May 14 4	+ 112	" 17 12	– 108	" 8 20	– 224
" 5 18	– 124							" 17 20	– 120	" 9 2	+ 422

TABLE L.—(Continued.)

DATES (ASTRONOMICAL TIME) AT WHICH UNUSUALLY LARGE DISTURBANCES OCCURRED AT THE ORDINARY OBSERVATION HOURS, WITH THE AMOUNT OF ABNORMAL VARIATION OF EACH SUCH DISTURBANCE.

TOTAL FORCE—Abnormal variation not less than .001 of the total force.

DATES.	Amount	DATES.	Amount	DATES.	Amount	DATES.	Amount	DATES.	Amount	DATES.	Amount
1858.		1857.		1859.		1860.		1860.		1861.	
D. H. .00		D. H. .00		D. H. .00		D. H. .00		D. H. .00		D. H. .00	
April 9 4 + 236		April 21 2 + 303		Oct. 4 20 - 108		May 11 4 + 117		Oct. 2 18 - 131		Aug. 2 4 + 151	
" 9 18 - 144		" 21 4 + 411		" 8 4 - 112		" 24 4 + 122		" 2 20 - 112		" 9 12 - 161	
" 9 20 - 133		" 23 10 - 121		" 11 18 - 143		June 10 18 - 189		" 3 18 - 126		" 18 18 - 137	
" 10 2 + 247		" 23 12 - 162		" 11 20 - 124		" 29 10 + 144		" 4 2 + 123		" 18 20 - 131	
May 7 10 + 113		" 28 18 - 342		" 12 2 + 178		" 29 12 + 109		Dec. 15 10 + 136		" 19 12 - 126	
" 7 12 - 217		" 28 20 - 160		" 12 4 + 139		" 29 18 - 277		" 15 12 + 132		" 22 12 - 118	
" 8 10 + 124		" 29 2 + 412		" 17 18 - 608		" 30 4 + 170		1861.		Sept. 15 18 - 121	
" 8 12 - 133		" 29 4 + 323		" 17 20 - 270		" 30 10 + 150		Jan. 22 4 + 122		" 19 12 - 129	
June 3 12 - 117		May 19 2 + 121		" 18 2 + 246		" 30 12 + 125		" 23 18 - 116		Oct. 9 20 - 113	
" 3 20 + 124		" 19 4 + 162		" 20 10 - 209		July 4 18 - 172		" 23 20 - 398		" 10 12 - 375	
" 23 2 + 120		June 8 2 + 100		" 20 12 - 114		" 4 20 - 583		" 24 2 + 139		" 23 18 - 150	
" 23 4 + 250		July 11 2 + 442		" 20 18 - 144		" 5 4 + 138		" 24 4 + 122		" 23 20 - 106	
" 23 10 - 393		" 11 4 + 178		" 20 20 - 419		" 5 12 - 165		" 24 12 + 102		" 24 12 - 323	
" 23 12 - 220		" 11 10 + 125		Nov. 11 12 - 137		" 19 10 - 131		" 24 18 - 108		" 25 2 + 112	
" 23 18 - 174		" 11 12 + 117		Dec. 7 18 - 143		" 20 12 - 163		" 25 2 + 183		Dec. 4 4 + 155	
" 24 2 - 163		" 17 18 - 303		" 12 18 - 201		August 6 10 + 139		" 25 4 + 120		" 9 18 - 143	
" 24 4 + 266		" 17 20 - 201		" 12 20 - 141		" 6 18 - 243		" 25 18 - 118		" 20 2 + 134	
" 24 10 - 123		" 18 4 + 125		" 14 12 - 190		" 6 20 - 251		" 26 12 - 213		" 20 4 + 186	
" 24 12 - 233		" 22 18 - 132		1860.		" 7 20 - 440		Feb. 27 2 + 134		1862.	
" 24 18 - 159		" 22 20 - 106		Jan. 27 20 - 111		" 8 2 + 215		" 27 4 + 137		Jan. 14 10 - 119	
" 30 18 - 101		August 16 12 - 115		Feb. 20 18 - 133		" 8 12 - 254		" 28 4 + 199		" 15 10 + 124	
July 4 18 - 208		" 21 18 - 101		" 20 20 - 166		" 8 18 - 217		" 28 12 - 180		" 15 12 + 111	
" 5 2 + 238		" 22 18 - 242		" 21 2 - 169		" 9 2 + 122		March 9 4 + 197		" 21 10 + 140	
" 5 4 + 210		Sept. 1 12 - 819		March 17 12 - 116		" 10 12 - 228		" 9 10 - 137		" 22 12 - 183	
August 20 18 - 109		" 1 20 + 533		" 18 18 - 101		" 11 12 - 135		" 9 12 - 120		Feb. 21 2 + 130	
Sept. 8 12 - 164		" 2 2 + 215		" 27 12 - 517		" 12 18 - 422		" 11 12 - 220		Mar. 5 18 - 255	
" 21 4 + 138		" 2 4 + 403		" 27 18 - 831		" 12 20 - 147		" 14 20 + 106		" 5 20 - 110	
Oct. 27 10 - 300		" 2 12 - 179		" 28 12 - 332		" 13 2 + 144		" 25 2 + 112		" 18 20 - 110	
" 29 12 - 174		" 3 2 + 203		" 28 18 - 442		" 13 4 + 141		" 25 10 + 116		April 2 4 + 147	
Nov. 18 18 - 128		" 3 10 - 216		" 29 2 + 338		" 16 2 + 169		" 25 12 + 113		" 10 18 - 148	
Dec. 4 12 - 186		" 3 12 - 235		" 29 4 - 201		" 16 4 + 173		April 14 18 - 116		May 6 12 - 188	
" 22 18 - 104		" 4 18 - 339		April 9 4 + 239		" 18 4 + 103		" 14 20 - 216		" 19 4 + 179	
1859.		" 4 20 - 162		" 9 10 - 110		" 18 12 - 151		" 15 4 + 329		" 29 18 - 203	
Jan. 9 18 - 108		" 5 4 + 163		" 9 12 - 136		Sept. 6 4 + 206		" 15 10 + 262		" 20 20 - 121	
Feb. 23 18 - 226		" 5 18 - 223		" 9 18 - 148		" 6 10 - 279		May 17 4 + 149		" 30 12 - 211	
" 23 20 - 201		" 6 2 + 112		" 13 10 - 104		" 6 12 - 806		" 17 12 - 132		July 5 2 + 209	
" 24 12 - 112		" 14 12 - 171		" 13 12 - 363		" 15 10 - 382		" 22 18 - 122		" 5 4 + 273	
" 25 20 - 142		" 16 10 - 126		May 4 20 - 112		" 15 12 - 196		June 12 12 - 109		" 23 4 + 144	
March 16 10 - 258		" 24 4 + 197		" 9 12 - 101		" 25 10 + 170		July 10 4 + 121		" 24 12 - 115	
" 31 18 - 112		" 24 10 + 113		" 10 18 - 185		" 30 18 - 131		" 10 18 - 151		Aug. 4 10 - 166	

TABLE L.—(Continued.)

DATES (ASTRONOMICAL TIME) AT WHICH UNUSUALLY LARGE DISTURBANCES OCCURRED AT THE ORDINARY OBSERVATION HOURS, WITH THE AMOUNT OF ABNORMAL VARIATION OF EACH SUCH DISTURBANCE.

TOTAL FORCE—Abnormal variation not less than .001 of the total force.

DATES.	Amount	DATES.	Amount	DATES.	Amount	DATES.	Amount	DATES.	Amount	DATES.	Amount
1862. D. H. August 4 18	.00 - 374	1862. D. H. Sept. 3 18	.00 - 120	1863. D. H. Sept. 16 10	.00 - 103	1863. D. H. October 3 20	.00 - 171	1863. D. H. October 6 10	.00 + 102	1863. D. H. Oct. 21 18	.00 - 333
" 13 10	- 205	" 8 18	- 165	" 25 18	- 219	" 4 2	+ 181	" 6 12	+ 117	" 21 20	- 110
" 14 2	+ 148	" 8 20	- 108	" 25 18	- 155	" 4 4	+ 103	" 9 4	+ 123	" 22 4	+ 197
" 25 12	- 114	" 9 18	- 120	October 3 4	+ 365	" 5 18	- 402	" 10 12	- 196	" 22 10	+ 196
" 30 18	- 181	" 16 2	- 133	" 8 12	- 396	" 5 20	- 237	" 11 12	- 110	Nov. 5 12	- 126
Sept. 3 4	+ 103	" 16 4	- 137	" 8 18	- 131	" 6 2	+ 148	" 13 12	- 107	Dec 25 18	- 114

TABLE LI.

INCLINATION—Abnormal variation not less than 180".

1853. D. H. July 12 4	" - 191	1854. D. H. April 23 10	" + 265	1857. D. H. Dec. 17 12	" + 225	1858. D. H. June 23 12	" + 350	1859. D. H. Feb. 9 12	" + 197	1859. D. H. Sept. 1 4	" - 207
" 18 12	+ 364	August 23 10	+ 253	" 23 10	+ 183	" 23 18	+ 235	" 22 12	+ 191	" 1 18	+ 971
Sept. 1 12	+ 237	" 23 12	+ 222	" 23 12	+ 181	" 24 2	- 279	" 23 10	+ 228	" 1 20	+ 3964
" 1 18	+ 192	" 23 20	+ 186	1858. " 24 4	- 253	" 24 4	- 253	" 23 12	+ 197	" 2 4	- 464
" 2 10	+ 375	Sept. 26 4	+ 193	Jan. 8 18	+ 280	" 24 10	+ 303	" 23 20	+ 185	" 2 10	+ 800
" 3 12	+ 335	October 4 12	+ 440	Feb. 16 10	+ 206	" 24 12	+ 281	April 21 4	- 390	" 2 12	+ 340
" 5 20	+ 242	1857. May 6 20	- 234	March 12 10	+ 256	" 29 18	+ 206	" 21 10	+ 200	" 2 18	+ 067
" 27 10	+ 263	" 7 4	- 263	" 12 12	+ 448	" 30 18	+ 227	" 21 12	+ 230	" 2 20	+ 190
" 27 12	+ 331	" 7 10	+ 685	" 12 20	+ 301	July 3 2	+ 236	" 22 18	+ 416	" 3 4	+ 106
Nov. 9 10	+ 338	" 7 12	+ 956	" 13 12	+ 217	" 4 18	+ 220	" 23 20	+ 376	" 3 10	+ 226
" 9 12	+ 195	July 11 10	+ 247	" 15 10	+ 183	Sept. 7 10	+ 230	" 29 2	+ 643	" 4 18	+ 097
1854. Jan. 2 4	+ 220	August 12 4	- 202	" 23 18	+ 206	" 8 20	+ 203	" 29 10	+ 258	" 4 20	+ 371
March 13 10	+ 239	Sept. 3 4	- 184	" 29 20	+ 228	" 19 18	+ 222	" 29 12	+ 219	" 5 2	+ 210
" 16 2	+ 184	" 3 10	+ 729	April 8 10	+ 245	" 20 10	+ 304	June 7 20	- 182	" 5 18	+ 460
" 16 12	+ 220	" 3 12	+ 619	" 9 2	- 403	" 20 12	+ 196	" 8 12	+ 377	" 5 20	+ 231
" 27 20	+ 311	" 9 20	+ 225	" 9 10	+ 238	" 21 10	+ 261	Aug. 23 18	+ 366	" 14 12	+ 299
April 10 10	+ 675	" 23 10	+ 238	" 9 12	+ 230	" 21 12	+ 275	" 28 20	+ 721	" 24 4	- 182
" 10 12	+ 973	Nov. 17 10	+ 313	" 9 18	+ 442	" 24 4	+ 192	" 29 2	+ 282	" 24 10	+ 347
" 10 18	+ 307	" 17 12	+ 410	" 9 20	+ 328	October 2 10	+ 221	" 29 4	+ 381	" 24 12	- 330
1855. Sept. 27 12	+ 233	Dec. 16 10	- 572	" 10 12	+ 250	" 27 10	+ 533	" 29 10	+ 246	Oct. 1 4	- 206
October 2 20	+ 184	" 16 12	- 377	" 15 10	+ 194	" 27 12	+ 745	" 23 12	+ 244	" 12 2	+ 505
" 4 10	+ 531	" 16 18	+ 1289	May 7 12	+ 248	" 29 12	+ 235	" 29 18	+ 314	" 12 4	+ 524
1856. January 20 18	+ 230	" 16 20	+ 1421	" 7 20	+ 218	Dec. 4 10	+ 265	" 29 20	+ 337	" 12 10	+ 351
" 20 20	+ 252	" 17 2	+ 242	" 10 12	+ 194	" 4 12	+ 003	" 30 2	+ 196	" 12 12	+ 220
		" 17 4	+ 245	June 3 12	+ 196	" 24 2	+ 183	" 30 18	+ 211	" 12 18	+ 275
		" 17 10	+ 194	" 23 2	- 182	1853. Feb. 9 10	+ 214	" 30 20	+ 203	" 12 20	+ 279
				" 23 10	+ 340			" 31 12	+ 193	" 17 4	+ 211

TABLE LI.—(Continued.)

DATES (ASTRONOMICAL TIME) AT WHICH UNUSUALLY LARGE DISTURBANCES OCCURRED AT THE ORDINARY OBSERVATION HOURS, WITH THE AMOUNT OF ABNORMAL VARIATION OF EACH SUCH DISTURBANCE.

INCLINATION—Abnormal variation not less than 180".

DATES.	Amount	DATES.	Amount	DATES.	Amount	DATES.	Amount	DATES.	Amount	DATES.	Amount
1859. D. H. October 17 18	" +1290	1860. D. H. March 23 10	" + 391	1860. D. H. August 8 2	" - 193	1861. D. H. Jan. 25 2	" + 265	1861. D. H. Oct. 10 2	" + 236	1862. D. H. Aug. 4 12	" + 757
" 17 20	+ 735	" 23 12	+1162	" 8 18	+ 435	" 25 4	+ 255	" 10 10	+ 331	" 4 18	+ 509
" 18 4	+ 206	" 28 18	+ 620	" 10 12	+ 329	" 25 10	+ 389	" 10 12	+ 731	" 4 20	+ 338
" 18 10	+ 199	" 28 20	+ 423	" 12 18	+ 835	" 25 12	+ 221	" 24 10	+ 381	" 5 18	+ 196
" 19 20	+ 306	" 29 2	- 309	" 12 20	+ 451	" 26 2	+ 275	" 24 12	+ 558	" 13 4	- 187
" 20 20	+ 560	" 29 4	- 531	" 18 4	- 187	" 26 4	+ 217	" 25 12	+ 180	" 19 12	+ 320
" 21 2	+ 188	" 29 18	+ 250	Sept. 6 4	- 432	" 26 10	+ 316	Nov. 7 2	+ 284	Sept. 3 18	+ 187
" 21 18	+ 229	April 9 10	+ 184	" 6 10	+ 521	Feb. 27 10	+ 220	" 7 4	+ 193	" 9 18	+ 181
" 21 20	+ 237	" 13 12	+ 482	" 6 12	+ 2244	" 27 12	+ 242	Dec. 6 10	+ 198	" 24 2	+ 197
Dec. 12 20	+ 592	" 13 18	+ 416	" 6 18	+ 593	" 28 10	+ 243	" 19 2	+ 203	" 25 12	+ 187
" 13 2	+ 281	June 29 18	+ 280	" 6 20	+ 472	" 28 12	+ 303	1862.		Oct. 3 4	- 237
" 13 4	+ 241	July 1 18	+ 267	" 7 18	+ 193	March 9 10	+ 342	Jan. 15 10	+ 282	" 3 12	+ 458
" 14 10	+ 365	" 2 10	- 277	" 10 10	+ 263	" 11 12	+ 279	" 15 12	+ 350	" 3 18	+ 320
" 14 12	+ 297	" 4 12	+ 239	" 15 10	+ 450	" 25 12	+ 184	" 21 10	+ 235	" 3 20	+ 236
1860.		" 4 18	+ 406	Dec. 10 12	+ 230	April 15 10	+ 265	Feb. 23 10	+ 193	" 5 18	+ 525
Feb. 18 10	+ 184	" 4 20	+1318	" 15 10	- 303	June 12 2	- 195	April 16 10	+ 199	" 5 20	+ 515
" 18 12	+ 195	" 11 18	+ 187	" 15 10	- 313	" 14 20	+ 191	" 10 12	+ 189	" 10 12	+ 566
" 21 4	+ 216	August 1 4	- 201	1861.		August 18 20	+ 228	May 19 4	- 298	" 21 18	+ 202
" 21 10	+ 233	" 6 12	- 191	Jan. 22 20	+ 186	" 19 12	+ 232	July 5 2	- 435	" 21 20	+ 237
March 27 12	+ 483	" 6 18	+ 718	" 23 20	+ 246	Sept. 15 18	+ 260	" 7 10	+ 226	" 23 2	+ 195
" 27 18	+1995	" 6 20	+ 412	" 24 2	+ 287	" 16 10	+ 183	" 8 18	+ 189	" 23 12	+ 196
" 28 2	+ 203	" 7 4	+ 198	" 24 10	+ 235	" 18 20	+ 250	August 3 18	- 228	Nov. 18 4	+ 246
" 28 4	+ 202	" 7 20	+ 961	" 24 12	+ 219			" 4 10	+ 296	Dec. 24 12	+ 226

TORONTO MAGNETICAL OBSERVATIONS.

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TABLE LII.

MONTHLY DETERMINATIONS OF ABSOLUTE DECLINATION REDUCED TO THE TWENTY-FOUR-HOUR MEAN MONTHLY NORMALS OF THE SMALL DECLINOMETER.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	MONTHS.
January ...	° /	° /	° /	° /	° /	° /	° /	° /	° /	° /	January.
February ...	...	1 44.88	...	1 54.30	1 58.54	2 02.82	2 06.41	2 08.53	2 12.37	2 15.71	February.
March .....	...	1 48.62	...	1 55.33	1 58.79	2 03.78	2 06.90	2 09.26	2 13.30	2 11.99	March.
April .....	...	1 47.15	...	1 55.23	2 00.61	2 04.44	2 06.73	2 09.95	2 13.24	2 13.91	April.
May .....	...	...	...	1 56.34	1 59.69	2 04.03	2 06.56	2 09.61	2 14.22	2 13.77	May.
June .....	...	...	...	1 56.12	1 58.85	2 03.72	2 06.84	2 08.93	2 13.17	2 14.44	June.
July	1 44.78	...	...	1 56.09	1 58.89	2 03.54	2 06.90	2 08.93	2 13.93	2 16.73	July.
August	1 48.07	..	1 51.90	1 56.06	1 59.85	2 04.33	2 07.24	2 10.38	2 14.10	2 16.22	August.
September..	...	...	1 51.94	1 54.44	2 01.86	2 06.34	2 07.39	2 11.36	2 14.71	2 15.91	September.
October ...	...	...	1 51.94	1 58.52	2 01.58	2 05.36	2 08.77	2 10.77	2 15.23	2 17.10	October.
November..	...	...	1 53.29	1 57.06	2 01.69	2 05.27	2 08.52	2 13.91	2 15.04	2 17.41	November.
December...	...	...	1 54.96	1 58.31	2 02.47	2 04.75	2 08.53	2 13.30	2 15.69	2 17.59	December.
December...	...	...	1 54.99	1 57.57	2 03.67	2 05.52	2 08.27	2 12.62	2 17.24	2 17.18	December.
Yearly } Means }	...	...	...	1 56.28	2 00.54	2 04.49	2 07.42	2 10.63	2 14.35	2 15.66	..

TABLE LIII.

MONTHLY DETERMINATIONS OF ABSOLUTE INCLINATION.

MONTHS.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	MONTHS.
January ...	75 22.06	75 21.40	75 24.05	75 23.70	75 24.25	75 24.60	75 24.47	75 24.37	75 23.80	75 23.10	January.
February ...	22.60	23.32	23.80	24.33	23.83	26.60	24.93	23.47	23.53	23.37	February.
March .....	...	23.05	23.75	23.97	24.47	26.22	24.97	24.57	24.30	23.62	March.
April	22.60	22.95	23.03	23.52	24.98	23.72	25.50	25.10	25.30	22.74	April.
May .....	...	22.95	23.55	22.72	23.93	23.87	24.37	24.27	24.33	23.33	May.
June	22.50	22.93	22.90	23.62	23.90	22.85	24.60	23.37	23.40	22.77	June.
July	21.48	24.28	23.10	24.15	23.92	23.25	24.07	24.20	22.97	22.90	July.
August	20.25	23.22	23.85	23.80	23.93	23.73	25.07	25.07	23.70	23.78	August.
September..	21.68	23.42	24.47	24.82	25.12	25.07	25.00	26.40	23.27	23.55	September.
October ...	22.40	21.95	23.47	24.87	25.02	24.50	26.43	26.00	23.80	23.85	October.
November..	23.00	22.15	23.28	24.57	24.43	24.47	26.03	23.83	23.37	22.82	November.
December..	22.33	23.88	23.26	24.55	24.10	24.43	24.27	23.93	23.27	22.43	December.
Yearly } Means }	75 22.17	75 22.96	75 23.54	75 24.05	75 24.32	75 24.44	75 24.98	75 24.55	75 23.75	75 23.15	...

TABLE LIV.

MONTHLY DETERMINATIONS OF THE ABSOLUTE MEAN NORMAL HORIZONTAL FORCE.

MONTHS.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	MONTHS.
January ...	...	3.5003	3.4868	3.4779	3.4724	3.4771	3.4843	3.4839	January.
February ...	...	3.5064	3.4728	3.4748	3.4771	3.4842	3.4826	3.4834	February.
March .....	...	3.5052	3.5113	3.4725	3.4752	3.4760	3.4829	3.4846	March.
April.....	...	3.5054	3.4761	3.4870	3.4796	3.4767	3.4787	3.4922	April.
May .. .....	...	3.5057	3.4901	3.5010	3.4771	3.4862	3.4988	3.4867	May.
June.....	...	3.5101	3.5025	3.4990	3.4793	3.4822	3.4836	3.4882	June.
July .....	...	3.5108	3.5002	3.5014	3.4828	3.4805	3.4872	3.4869	July.
August.....	...	3.5070	3.5002	3.5005	3.5015	3.4778	3.4847	3.4839	August.
September..	3.5294	3.5037	3.4826	3.4951	3.4799	3.4790	3.4796	3.4840	September.
October ...	3.5124	3.5039	3.4823	3.4941	3.4842	3.4774	3.4817	3.4793	October.
November..	3.5097	3.5046	3.4762	3.4865	3.4816	3.4769	3.4822	3.4819	November.
December..	3.5100	3.4959	3.4783	3.4907	3.4825	3.4760	3.4803	3.4889	December.
Yearly Means }	...	3.5049	3.4883	3.4900	3.4811	3.4792	3.4839	3.4853	...

TABLE LV.

MONTHLY VALUES OF THE ABSOLUTE TOTAL FORCE.

MONTHS.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	MONTHS.
January ...	...	13.8815	13.8367	13.8068	13.7829	13.8000	13.8195	13.8073	January.
February ...	...	.9157	.7745	.8252	.8085	.8141	.8088	.8073	February.
March .....	...	.9053	.9373	.8101	.8016	.7987	.8217	.8180	March.
April.....	...	.8989	.8053	.8290	.8272	.8097	.8208	.8344	April.
May .....	...	.8878	.8450	.8870	.7997	.8345	.8856	.8222	May.
June.....	...	.9193	.8935	.8632	.8120	.8048	.8107	.8194	June.
July .....	...	.9303	.8847	.8792	.8177	.8109	.8185	.8163	July.
August.....	...	.9099	.8850	.8829	.9077	.8135	.8195	.8180	August.
September..	14.0091	.9123	.8334	.8824	.8208	.8389	.7928	.8147	September.
October ..	13.9258	.9141	.8305	.8696	.8602	.8263	.8096	.8004	October.
November..	.9124	.9123	.7974	.8386	.8435	.7908	.8048	.7952	November.
December..	.9135	.8775	.8005	.8548	.8198	.7888	.7957	.8168	December.
Yearly Means }	...	13.9054	13.8436	13.8524	13.8251	13.8109	13.8173	13.8143	...

